The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. IX. No. 232 NOVEMBER 24, 1923 Prepaid Annual Subscription: United Kingdom, £1.1.0; Abroad, £1.6.0.

Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

The prepaid subscription to THE CHEMICAL AGE *is 21s. per annum for the United Kingdom, and 26s. abroad. Cheques, Money Orders and Postal Orders should be made payable to Benn Brothers, Ltd.*

Editorial and General Offices—8, *Bouverie St., London, E.C.4.*

Telegrams: "Allanges, Fleet, London." Telephone: City 9852 (6 lines).

Mechanical Handling Plant

THERE is no need to emphasise the fact that the recovery of trade prosperity, or rather our ability to secure a larger share of the present attenuated world trade, depends to a great extent upon the will and ability to reduce manufacturing costs. It will not be denied that for many everyday operations the human machine is not designed for speed or capacity; accordingly, though in many cases it has no rival owing to its adaptability and capability of being turned to a multitude of different uses, there can be no doubt that, as a machine, it is extremely costly. In the majority of industrial works, particularly the larger ones, there continue from day to day certain operations which, if performed by manual labour, tend towards the development of mere automatons, and from both the commercial and social point of view it is far preferable that work of the kind should be done by machinery rather than by men. As we have pointed out on previous occasions, the introduction of machinery is a beneficial movement from the standpoint of the progress of any race, for the reason that machinery creates a demand for the craftsman and tends to eliminate the type who works with muscle rather than with mind. By publishing periodically special issues devoted to the mechanical handling of materials THE CHEMICAL AGE has been instrumental in placing before chemical engineers a number of ideas as to the applications of machinery to the particular problems which are met with daily on chemical works. It is gratifying to find that mechanical handling is making sure progress on such works; but the progress is not as rapid as might have been looked for, although the difficulty in recent years of finding the necessary wherewithal for the erection of plant (added to which is the fact that prices have been far from becoming stabilised) has undoubtedly proved a serious barrier to development.

In this issue we are once more mainly concerned with the present-day facilities for mechanical handling, and elsewhere the matter is generally treated by writers who have specialised in the various phases of the subject. We do not propose to reiterate the conclusions they have formed, but we feel that as an example of the duties which may be relegated to machinery we cannot do better than refer our readers to the noteworthy enterprise recently undertaken by the Electrolytic Zinc Company of Australia. We hope at some future date to be able to give a full description of the plant lately introduced at the Risdon works of this company, for it provides an outstanding example of the manner in which time and cost of handling may be reduced to a minimum by modern equipment of locomotive cranes and conveyors.

Chemical Leaders as Candidates

CHEMICAL industry is more strongly represented among the candidates at the present general election than it was in that of twelve months ago, though its representation in the new House may not correspond with this increase. The political views of the candidates indicate the difficulty of organising a chemical Parliamentary group, for the differences of opinion and point of view which exist now would exist when they met as a group, and common action, though not impossible, would often be difficult. The division of parties is sharply illustrated in South Islington, where Mr. C. S. Garland, who captured the seat at the last election as a Unionist candidate, and who is actively interested in several chemical organisations, is to be opposed by Mr. E. Brotherton-Ratcliffe, the head of a firm of chemical merchants, who stands for Free Trade. Here the manufacturing and the merchanting interests are openly in conflict, as they will be in a large degree throughout the country. In the Limehouse Division, Mr. T. Miller-Jones, of the Invicta Works, has set out to recover as a Unionist a seat long held by Sir William Pearce as a Liberal. His policy is pointedly summed up in one passage from his address—"The trade unions quite rightly protect one British workman against another, so why not protect him against the foreigner?" Any increase

in the price of food is, however, expressly excluded. These appear to be the only chemical condidates in the London area.

Outside several prominent leaders in chemical industry are already selected. Sir Alfred Mond, whose reputation as a Parliamentarian has advanced so much of late and who would certainly occupy a high place in any future Liberal Administration, is standing for his present seat, West Swansea, against Professor Hewins, who played so prominent a part in Mr. Joseph Chamberlain's Tariff Reform campaign, and a Labour representative. Sir Max Muspratt, a prominent Liberal leader and Free Trader, may contest the Exchange Division of Liverpool against the present Unionist member, Sir Leslie Scott. Dr. G. C. Clayton, a director of the United Alkali Co., of which Sir Max Muspratt is the chairman, is again standing as Unionist candidate for Widnes, where at the last election he scored a dramatic success against Mr. Arthur Henderson. An interesting addition to this list is Sir William Alexander, the chairman of the British Dyestuffs Corporation, who is contesting Central Glasgow as Unionist candidate. Sir William has long favoured steps for the development of Empire trade, and his presence in the House would be an important factor in any discussions on the dyestuffs industry. The Liberals of Glasgow Central have decided to invite the Right Hon. H. J. Tennant to contest the seat; in the event of his acceptance an interesting position would arise, the Unionist candidate being chairman of Ogston and Tennant (Ltd.), and the Liberal candidate the youngest son of one of the founders of the firm, Sir Charles Tennant.

Other candidates associated with chemical and allied industries are Sir Sydney Henn (Blackburn, U.), chairman of Lankshear, Wickstead, and Co., tartaric acid manufacturers; Sir F. B. Sanderson (Darwen, U.), of Wray, Sanderson and Co., Ltd.; Mr. Geoffrey Mander (Cannock Division of Stafford, L.), of Mander Brothers, paint and varnish manufacturers, Wolverhampton; Lieut.-Colonel K. Vaughan-Morgan (Fulham, U.), a director of the Morgan Crucible Co., Ltd.; Lieut.-Commander Astbury (West Salford, U.), who as a colour user has taken an active part in the defence of the Dyestuffs Act; Sir William Edge (Bolton, L.), the head of a well-known dye firm; and Sir R. Bird (West Wolverhampton, U.), of Alfred Bird and Sons.

The B.S.A.F. Annual Report

THE survey of the British Sulphate of Ammonia Federation's work which was given by Mr. D. Milne Watson at the annual meeting last week is mainly remarkable as showing the results which can be obtained by an educative campaign among potential consumers. One has only to turn to the example of Germany to see that the great difference between the consumption of nitrogen in that country on the one hand, and the United Kingdom and France on the other, leaves a vast field for extension of work such as that which the Federation is conducting, particularly as propaganda on a large scale is carried on by those whose interests lie in nitrate of soda. If the sulphate of ammonia business is to prosper there can be no question that attention must primarily be given to the matter of quality, so that purchasers may come to appreciate by experience that the old acid salt of pre-war days is now more or less a thing of the past. That low-testing salt of this type is still finding its way to the market cannot be denied, but that the B.S.A.F. have been remarkably successful in their campaign for its gradual elimination is indicated by the announcement that 70 per cent. of the whole of the material they market is now of the neutral grade. This, in fact, is an increase of 20 per cent. on the figure for the previous year.

A significant feature in the manufacture of sulphate of ammonia at the present time is that whereas prices both at home and abroad are drooping the cost of manufacture still remains unpleasantly high. It has to be borne in mind that each ton of sulphate demands about 22 cwt. of sulphuric acid for its manufacture; and, accordingly, the price of acid is of more than ordinary interest to the sulphate producer. Some of the larger producers are, of course, able to surmount this obstacle by manufacturing their own acid from spent oxide of iron which is a by-product of their principal process. The small producer, however, has to secure his acid on the open market, and frequently it has to be transported over considerable distances. At least it is encouraging to find from Mr. Milne Watson's remarks that the sulphuric acid makers are fully cognisant of the important relation which exists between them and the prosperity of the sulphate of ammonia trade, and it is to be trusted that some useful results will materialise from the discussions which are taking place between the two associations.

New Potash Prospects

THE Italian potash deposits and the methods by which they are worked which were described last week by Professor Hinchley before the Chemical Engineering Group are particularly attractive to chemists from the nicety with which the required chemical changes are obtained, and it is safe to say that if the processes are as favourable as they appear to be, then this discovery is the most important event of its kind that has occurred for many years. When Baron Blanc was making a survey of the acid lavas of Italy with a view to the extraction of potash he was lucky in finding an abundant deposit of the mineral leucite, which is a practically pure silicate containing potash and alumina. It is further fortunate that after a simple crushing operation the mineral should prove capable of separation electro-magnetically from its ferruginous impurities. The resulting leucite if finely powdered forms a valuable fertiliser in which the potash seems to be readily available. To quote a comment by Dr. W. R. Ormandy, in the course of discussion on the paper, the Baron's luck was extraordinary, as it was found eminently practicable to treat the coarsely crushed mineral with sulphuric acid, resulting in a practically pure alum and no residue, as the molecular proportion of potassium and aluminium in the mineral and the product is identical. Not only that but heat is evolved in this process and also in the corresponding process by treating with hydrochloric acid for the production of potassium chloride and aluminium chloride. Though the latter is obtained in the hydrated state and so far has not

been converted to the valuable anhydrous form, a method for obtaining a pure aluminium oxide suitable for metallurgy has been worked out.

The majority of these processes are now working commercially in Italy or France. It is obvious that they form a basis for the erection of a flourishing chemical industry, and it is suggested that the crushed and separated leucite should be exported to England, as the deposits are only twelve miles from the west coast of Italy and a telpher line could readily be erected. The raw material could then be profitably treated in this country, and potash salts and other products obtained. The cost of preparing muriate of potash is said to compare very favourably with that from the Stassfurt deposits, even after allowing for freight, because no power-absorbing evaporation methods are required in the process. It is impossible to foresee in what directions the development of this mineral may lead in the future, but the possibilities are very wide, and should be closely investigated, not only for the sake of providing an additional source of potash, but in order to extend the British chemical industry into fields so far hardly touched.

Standardised Coal Tests

THERE can be no question that a properly-conducted survey and subsequent classification of the coal seams in the various coal-bearing districts in this country would provide information of direct national value which it is difficult to estimate. The task is of a magnitude which might prove discouraging to anybody other than the energetic Fuel Research Board, which within late years has shown that it accepts nothing as impossible; but, the results would be shorn of the greater part of their value if the methods of examination had failed to be systematically standardised. In the matter of coal analysis no really standard methods of testing are extant, different investigators have adopted variations in their procedure, and in consequence results are not only incomparable, but frequently they may be misleading. Such a statement does not in any way reflect upon the proficiency of the investigators. It merely emphasises the inefficacy of making comparisons when each worker starts off, so to speak, from a different datum line. In order to ensure that the results of examinations of coal should not suffer from such uncertainties the Fuel Research Board appointed a committee to go into the question and prepare detailed instructions for carrying out the various tests. An interim report of the committee has just been published, and the recommendations made have been adopted by the F.R.B. for the purpose of their work.

A glance at the methods which the committee have approved does not convey the impression that any striking departures have been introduced. In coal analysis, however, very much depends upon the care and faithfulness with which small details are executed, with the consequent elimination of sources of error which are apt to be overlooked. While, therefore, the methods *per se* are devoid of novelty, the general instructions which are given for carrying them out are full of helpful points which should make not only for standardisation but for accuracy. We are glad to note that Dr. Lessing's coking test has at last received the recognition which its ingenuity deserves, particularly as from our own experience of it we have found that to those associated with the carbonisation of coal it gives a wonderfully useful indication of the physical properties of the type of coke which will be yielded when carbonisation is conducted in bulk. On previous occasions we have been pleasantly struck by the fact that the F.R.B., though a Government Department, conducts its work much more on the lines of that of a business undertaking, and in this case it once again shows its appreciation of the requirements of the average individual by not keeping back the information until the full report is ready. To use the Board's own words, "many analysts are less concerned with the evidence on which the conclusions are based than with the conclusions themselves"—a useful aphorism which other official departments might assimilate with advantage.

Points from Our News Pages

Special articles are published dealing with "The Storage of Minerals in Open Spaces" (p. 562); "The Use of Conveyors in Chemical Works" (p. 565); The Prevention of Corrosion (p. 566); and "Devices for Mechanical Handling (p. 568).

The Methods of Working the Italian Potash Deposits were described last week by Professor Hinchley before the Chemical Engineering Group (p. 572).

Letters are published from Mr. W. J. V. Woolcock and Professor H. E. Armstrong (p. 573).

According to our London Market Report, there has been great activity in most branches of the chemical trade, and news from Germany seems to portend a substantial rise in prices (p. 583).

Business in the Scottish heavy chemical market has been rather unsettled, and German prices have been inclined to be higher, according to our report (p. 586).

Books Received

CLOUDS AND SMOKES. By W. E. Gibbs. London: J. and A. Churchill. Pp. 240. 10s. 6d.

SECOND YEAR BOOK OF THE INSTITUTION OF THE RUBBER INDUSTRY, 1923. Pp. 448. 5s.

PHARMACEUTICAL AND FOOD ANALYSIS. By Azor Thurston. London: Chapman and Hall, Ltd. Pp. 416. 21s.

The Calendar

Nov.		
26	Chemical Industry Club: Annual Dinner. 7.30 p.m.	Connaught Rooms, London.
26	University of Birmingham Chemical Society: "Chemical Theories of Atomic Structure." Mr. C. J. A. Taylor.	Birmingham.
26	Society of Dyers and Colourists (Leeds Junior Branch): "Works Filtration." Dr. Forster.	Leeds.
27	Hull Chemical and Engineering Society: "Recent Advances in Colloid Chemistry." Mr. A. V. Slater. 7.45 p.m.	Hull Photographic Society's Room, Grey Street, Hull.
29	Society of Dyers and Colourists (West Riding Section): "The British Dye Industry." Dr. H. Levinstein.	Bradford.
29	Society of Dyers and Colourists (Midlands Section): "Bleaching with Hydrogen Peroxide." Mr. I. E. Weber.	Nottingham.
30	West Cumberland Society of Chemists and Engineers: "Some Aspects of the Scientific Study of Coal." Dr. F. S. Sinnatt.	Technical College, Workington.

Storage of Minerals on Open Ground: Considered in Relation to Reclaiming Requirements.

By Herbert Blyth, M.Inst.C.E.

THE problem of storing minerals on large open spaces—when considered in relation to the necessity for frequent and complete recovery of material from the stock heap without hand labour—has hitherto presented many difficulties involving considerable cost and often a multiplicity of mechanical handling appliances of different types.

This question is an important one for the chemical industry, in which it is fully recognised that "efficient mechanical handling" is the key to "cheaper and more rapid production," and although the "need" is well defined, the "means" proposed for meeting it are often too expensive compared with the tonnage concerned or too costly to maintain.

The required facilites for recovery from the dump generally present the greatest difficulty—certainly as far as the first cost

FIG. 1.—STORAGE GROUND SERVED BY A MONO-RAIL TELPHER PLANT AT STRATFORD GAS WORKS.

is concerned. In the past the provision for recovery has been made by constructing the bottom of the store with sufficient inclination to cause the material to gravitate to a self-feeding conveyor placed in a tunnel a little below ground level, but the excavation and constructional cost of such a scheme, together with provision which must be made for inspection and maintaining the conveyors placed in such an unfavourable position, prevent its serious consideration.

It is, of course, a relatively easy and inexpensive matter to arrange for simply dumping material on an open ground without any restriction as to the depth of the heap or consideration of the question of reclaiming.

When, however, the depth has to be limited, as in the case of coal, and further, where one and the same means has to serve for "reclaiming" as well as "dumping," the correct solution of the problem can only be found by a careful study of many different factors, such as the nature of the material, extent of the storage, frequency of dumping and recovery, direction and distance to which the material has to be conveyed, etc.

There are four well-known systems which provide for the double duty of dumping and reclaiming with varying degrees of efficiency and costliness in initial expenditure and maintenance. These systems may be summed up as follows:—

I.—Conveyor Method

Any type of conveyor which can be conveniently mounted, complete with its driving gear, upon a travelling gantry, will serve for dumping, provided that means are installed for feeding such a cross conveyor at any point of its longitudinal travel

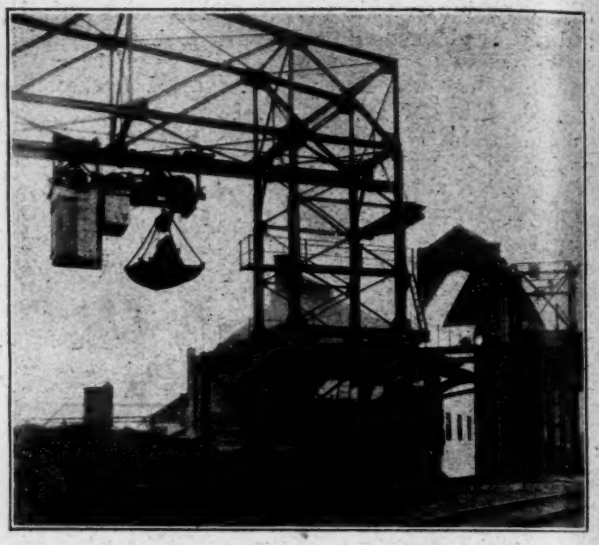


FIG. 2.—PIVOTAL END OF A ROTATING TELPHER GANTRY AT A MUNITION FACTORY.

over the store. A belt conveyor can be used for most materials with very satisfactory results as regards efficiency, facility for feeding, variable discharge, and capacity.

For reclaiming from stock the usual method adopted in connection with such a conveyor is to mount a travelling jib crane, with grab, upon the top of the same travelling gantry. By means of the grab the material may be dug up on both sides of the gantry and fed back on to the conveyor through a suitable hopper which travels on the gantry with the crane. If the cross conveyor is of the belt type, it must always run in the same direction, whether dumping or reclaiming, and when performing the latter duty must deliver its load to a second longitudinal conveyor placed on the opposite side of the store to the feeding conveyor.

Such a system, therefore, requires three separate conveyors in addition to the jib crane on the travelling gantry.

II.—Simple Transporter System with Fixed Track

Fig. 1 shows a double line of transporter track placed longitudinally with the store and mounted upon fixed cantilever frames at 25 to 30 feet apart. It will be seen that such an arrangement provides for only partial recovery of the stock

FIG. 3.—ELEVATION OF A ROTATING TELPHER GANTRY SHOWING THE OUTER LEG AND RAIL.

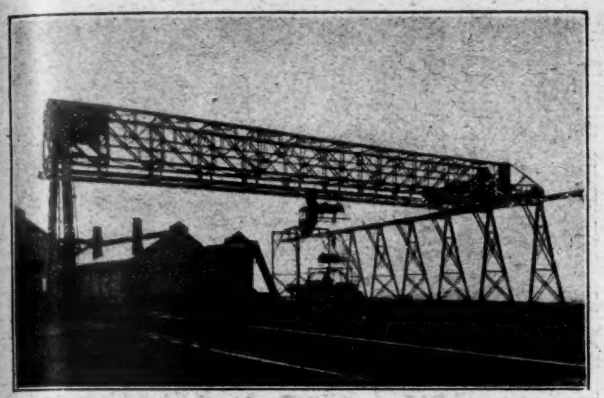


FIG. 4.—GENERAL VIEW OF PARALLEL MOVING TELPHER GANTRY CONNECTED TO FIXED TELPHER LINE.

directly by the transporters—when it becomes necessary to use up the whole of the stock a jib crane is required to trim the material under the transporter tracks.

III.—Transporter Operating on Rotating Gantry

This system is illustrated in figs. 2 and 3, and it is perhaps one of the cheapest methods yet devised for handling materials to and from an open stock heap.

It is true that it has certain limitations in regard to storage capacity on account of its radial motion, and further, the range of action of the transporter is limited to the length of the bridge—auxiliary means having to be employed to carry the material to any point beyond the dump. Fig. 2 shows the pivotal end of the transporter bridge, which is arranged above the grabbing pit, into which the material is discharged from railway trucks by means of the rotary tippler seen on the right. From fig. 3 it will be understood that the transporter machine is capable of lifting the material from the pit and discharging at any point within the semi-circular dump by setting the bridge on any desired radial line from the centre of the pit. Alternatively, the material can be lifted from any point of the dump and redeposited in the pit, from which it is transferred, by the inclined conveyor, to overhead bunkers within the building shown on the left. This system involves double handling from the dump by means of two entirely separate units—the material having to be lifted, conveyed, load is thus dealt with by a single handling and may be conveyed in any direction after leaving the bridge.

Another important feature is the facility for, and low cost of, extensions of the system to serve an increased length of storage as may be required—this being simply a matter of adding extra lengths to the fixed rails.

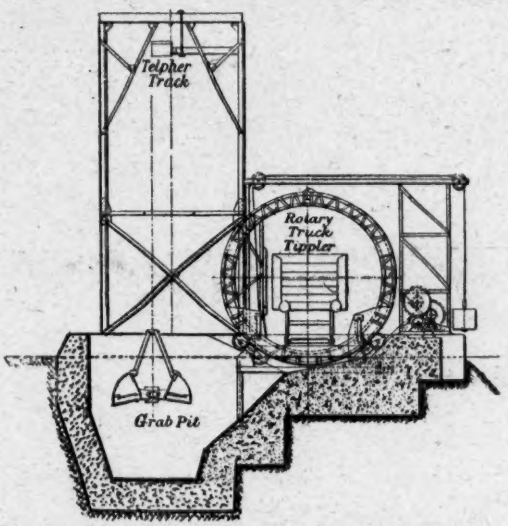


FIG. 6.—ROTARY TRUCK TIPPLER AND TELPHER GRAB OVER PIT.

This system also provides for the simultaneous performance of the dumping and the reclaiming duties without any interference—there would be two tracks on the bridge and two or more telpher machines can be used at the same time.

Fig. 4 shows a general photographic view of a plant which was erected during the war at a South Wales factory. Fig. 5 is a plan view of the storage ground and clearly indicates the fixed track with the running switch connections to the bridge tracks.

In addition to the running switches leading to the bridge, auxiliary switches are also provided for the purpose of changing the telphers from one side of the bridge to the other. The

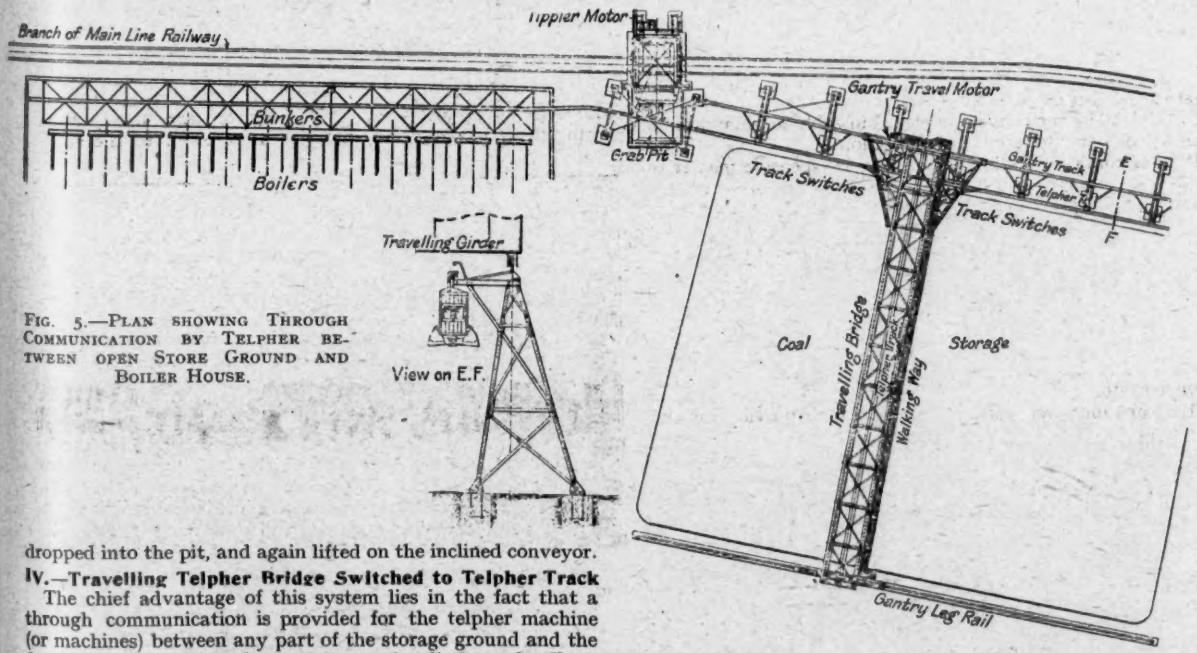


FIG. 5.—PLAN SHOWING THROUGH COMMUNICATION BY TELPHER BETWEEN OPEN STORE GROUND AND BOILER HOUSE.

dropped into the pit, and again lifted on the inclined conveyor.

IV.—Travelling Telpher Bridge Switched to Telpher Track

The chief advantage of this system lies in the fact that a through communication is provided for the telpher machine (or machines) between any part of the storage ground and the final station at which the load has to be discharged. Each

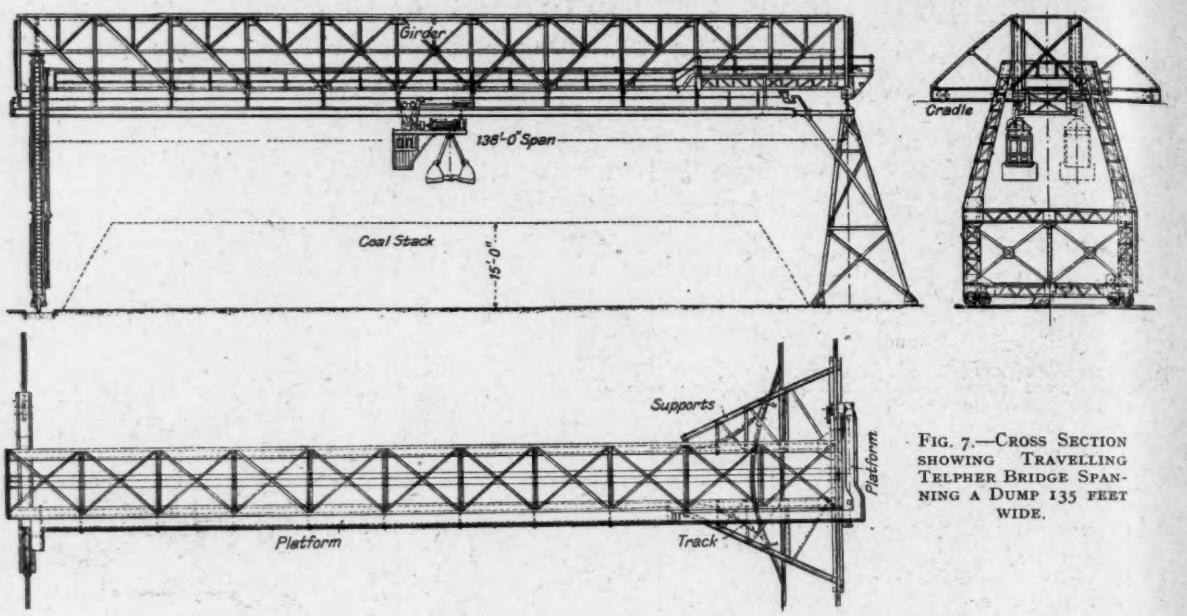


FIG. 7.—CROSS SECTION SHOWING TRAVELLING TELPHER BRIDGE SPANNING A DUMP 135 FEET WIDE.

store ground can be fed from either end—or material can be fed in on one side and taken out on the other at the same time.

This bridge has a span of 140 ft. and is driven by two motors—one at each end. The wagons are discharged by the rotary tippler (fig. 6) into the pit, the centre of which is crossed by the fixed track.

Figure 7 is a cross sectional view of the bridge spanning the dumping ground. The elevated rail for the bridge and also the fixed telpher line are shown on the right and a ground rail is shown on the left.

If necessary a fixed telpher line can be provided at both ends of the bridge—the ground track on the left would then be replaced by an elevated track, and the arrangements at both ends of the bridge would be identical.

The four types of plant referred to above can be adapted for storing any class of mineral, but care must be exercised in the selection of that type which is most suitable for any particular set of conditions if the scheme is to be a commercial success.

The writer is indebted to Messrs. Strachan and Henshaw, Ltd., of Bristol, and also to Messrs. Spencer and Co., Ltd., of Melksham, for the photographs and drawings.

Electro-Chemical Deposition

SOME interesting examples of the application of electro-chemical deposition are supplied by Fescol, Ltd., in pamphlets and other papers which give an account of the special features of their process for rebuilding worn and waster machinery parts. This is a cold process, by means of which a hard-wearing surface may be applied to a worn machine part and perfect cohesive adhesion secured. The results of some adhesion tests carried out at the National Physical Laboratory are given in proof of the company's claims. In one case a thread of 40 per inch was turned on the nickel coating, and this was screwed into a steel holder with a length of thread (L) = 0·215 in.; the thread of the steel holder stripped with a load of 6·74 tons, leaving the thread on the nickel intact. The average scleroscope hardness number of the steel holder was 28. The adaptability of the process to all sorts and conditions of parts is one of the obvious advantages, for any part deficient in size can be built up to the original standard size. Many examples are given. By means of this process nickel or copper is deposited upon ferrous metals and their alloys, copper and its alloys, aluminium and its alloys, to almost any desired thickness, in such a manner that machine parts which have become below standard size through wear and erosion or have been machined in error may be made good. The use of copper or nickel as protectives applied to ferrous metals and aluminium permits of these metals being used for purposes which hitherto have been impossible. Fittings Fescolised in nickel are said to require very little cleaning even when exposed to atmospheric conditions; this applies particularly to railway, ships, public vehicular and other fittings. The process differs essentially from plating in that the deposit becomes an integral part of the basic metal, oxidation is prevented, peeling and stripping do not occur, and the deposited metal can be incorporated and imposed to any depth and is extremely hard. The works in Penarth Street, Canterbury Road, London, S.E., are open to any readers interested in the process.

Non-Metallic Minerals in Canada

THE possibility of establishing grinding plants in Canada to produce the many varieties of finely ground non-metallic minerals used in Canadian industries is the subject of a comprehensive report prepared in the Mining, Metallurgical, and Chemical Branch of the Dominion Bureau of Statistics. Heretofore, though extensive deposits of the crude material are known to exist in Canada and though these deposits are in certain cases being worked, the bulk of the supply has been derived from importations. It has been suggested that it is feasible to substitute Canadian products for certain of these importations, and it is the purpose of the report now described to present the data required for computing the probable extent of the substitute market which might thus be developed.

With the exception of sulphur in the native state, whiting and some special grades of clay, Canada possesses important deposits of almost all the non-metallics most commonly used in industries. The minerals now being consumed in Canada in the ground or prepared form are: Actinolite, barytes, calcite, whiting, dolomite, corundum, feldspar, fluorspar, gypsum, lime, magnesite and magnesia, mica, iron oxides, quartz or silica, including silex and flint, tripolite, and talc. Of these, gypsum and magnesite are produced in considerable tonnages, are calcined and otherwise prepared in Canada, and supplied in the ground form and larger sizes to consumers both in Canada and abroad. Talc is ground and produced in several marketable grades which are shipped to consumers throughout Ontario and Quebec as well as the United States. Lime is mainly used as crude quicklime in the building trades, pulp manufacturing, sugar and glass-making industries, and a limited amount is used as lime-flour. Actinolite, quartz, feldspar and mica are now being prepared to a limited extent in Canada.

Copies of the complete report may be had by those interested on application to the Dominion Bureau of Statistics at Ottawa.

The Use of Conveyors in Chemical Works

By Hartland Seymour

THE employment of mechanical handling devices is gradually extending throughout the manufacturing industries, and amongst these chemical works are finding ever increasing fields for their use. When one considers the advantages offered by a well-designed conveying system one is not surprised at their growing popularity. In the first place the amount of non-productive labour is decreased; secondly, the progress of the product through the plant is materially quickened, and direct supervision or management, always essential where manual handling is employed, is saved.

This does not mean that any or every continuous conveying system will help to reduce costs; if it were the case these conveyors would be standardised in one kind, whereas they are available in almost innumerable types. When deciding on a system the key to the choice is the flow-sheet of the plant. A flow-sheet should be drawn up for each process and for the links connecting the process; and finally from the last operation to the packing and shipping department. In this way can be ascertained whether the finished product progresses in a straight and unbroken line from raw material to shipment, or whether the flow-sheet is broken, discontinuous or if multiple products run in parallel. Such a flow-sheet will show where processes and products impinge, cross or intermingle. In each case there will be a mechanical handling device which will save both time and labour. In many instances the varying requirements of the plant can be met by installing different types.

Briefly, continuous conveyors may be divided into those which carry the material on a continuous band, those in which push plates, scrapers, pans, slats or buckets are bolted to an endless chain, and those constructed on the principle of a spiral rotating in a trough. In addition there is the pneumatic conveyor.

Continuous Conveyors

Band or belt conveyors are all built on the principle of a continuous band running over end drums and supported throughout their course by idler rollers, though the material of the belt varies; it may be leather, composition fabric, rubber or metal, and the idler rollers may be so grouped as to make the band run in the form of a continuous trough or perfectly flat. The material may be fed on at any point, or at a multiplicity of points, and is discharged over the end drum or at any selected point by travelling throw-off carriages or ploughs.

There are three important points in connection with band conveyors to which great attention should be paid. In the first place the band itself must be hard-wearing and not susceptible to any chemical reaction with the material it is carrying. Secondly, if the material to be carried is abrasive in any degree it is better to run the belt flat, otherwise, if troughed, the wear on the belt will be very much greater along the centre than anywhere else. When run flat a wider belt must naturally be used and this will be more expensive initially, but will be cheaper in the long run owing to the wear being evenly distributed. Thirdly, the method of feeding the material on to the band must be so arranged that the belt does not receive undue shock otherwise excessive wear will result. The more gently the product is fed to the conveyor the better. It is also important that the band is adequately supported throughout its length and that the rollers are oiled frequently.

Belt conveyors have increased rapidly in popularity and are used now in all kinds of chemical plants for carrying raw materials, the product from one operation to the next and when finished, either loose, in bales, bags or cases.

One of the most popular conveyors is the gravity bucket. The chief advantage which this system offers is that the same means of conveyance can be used for carrying the material horizontally, vertically or at any angle, the buckets being so attached to the chain that they remain upright and always preserve their equilibrium in whatever direction the chain may be travelling. In fact, this conveyor has been very aptly described as a train of tipping cars linked together. The conveyor is almost entirely automatic in its action, no handling being necessary from the point at which the material is delivered into the receiving hopper until it is discharged.

When delivery at one point only is required one of the most suitable conveyors is the pan type. This consists of a series of overlapping pressed steel trays or pans with turned up sides bolted to an endless chain. Either a single strand of chain is used or sometimes a double length of lighter construction. The tray or pan conveyor may be built to carry material horizontally or up an incline, though they are not constructed on the gravity principle, and consequently cannot be employed vertically or on steep gradients. These conveyors have been made up to 800 feet centres and with a carrying capacity of 150 tons per hour. This, again, is a conveyor suitable for loose materials.

In the scraper conveyor a series of scrapers or push plates is bolted either to a single or a double strand of chain and work in a trough into which the material is discharged and carried along by the action of the plates.

The material can be discharged at any point along the system by the simple operation of sliding open doors cut in the bottom of the trough. The scraper conveyor may be designed to carry almost any tonnage per hour; it is hard-wearing and exceedingly serviceable where abrasive materials have to be carried. This, again, is a conveyor for handling loose materials.

The slat or apron conveyor is equally suitable for loose, bagged or crated goods. It consists of a number of wooden or metal slats bolted to an endless chain running between guides or on rails. In the wooden conveyor a series of well seasoned hardwood slats is mounted on roller chains. The metal type is made up of a number of double-headed steel flights bolted between two lengths of chain. When in operation the flights always overlap so that they form a continuous apron upon which material of small size can be carried. The conveyor may be built to operate inclined, horizontal or a combination of both. As a general rule the angle of inclination should not exceed 30 degrees.

In normal circumstances I would advocate the steel slat for carrying loose material of a friable nature and the wooden slat for materials in bulk. The wooden type is ideal for transporting boxes, bales, bags and packages on the horizontal or up an angle not exceeding 20 degrees. If the objects carried have a tendency to roll, wooden cleats may be bolted to the slats at intervals. The slat conveyor has proved very popular in progressive assembly plants, though its application is practically universal.

Another type of continuous conveyor is the spiral. This consists of a substantial cast-iron circular bottomed trough, formed in sections with flanged joints. The spiral is made of a hard, close-grained cast-iron and joined together and threaded on to a hexagonal high tensile steel shaft. A typical such scroll or worm is 15 in. in diameter with a pitch of 12 in. One end of the trough is fitted with an end plate containing a bearing for the shaft. Other bearings are provided in the form of hangers fixed to the conveyor trough. Heavy bushes are provided in each bearing, and the shaft is extended at one end for a coupling or pulley for driving the conveyor. A spiral conveyor of this type is large enough to carry about 15 tons per hour when running at a moderate speed. This is, of course, essentially a conveyor for loose materials.

Pneumatic Conveyors

A type of conveyor which seems to have a future is that which operates on the pneumatic principle. This conveyor consists essentially of a pipe line from the load of material to the receiver. From the receiver the pipe leads to a vacuum pump which draws the necessary air at a high velocity through the pipe and receiver and with sufficient force to carry the material. The material is trapped in the receiver, its velocity being diminished in proportion to the relative cross sections of air line and the receiving chamber. Gravity carries the material to the hopper-shaped bottom of the receiver, where it is discharged through a lock. The air is then drawn through the pump and discharged.

Such a conveyor can be used for a variety of purposes, but it is obvious that it is not applicable to materials carrying

a very fine dust. This dust would be drawn right through the whole system and discharged with the air. Typical uses for the pneumatic conveyor are for carrying coal and atomised metallic lead, running from the size of a pea to extreme fines. Other uses are in sand-blasting for carrying sand and in carbon plants. In the latter case by regulating the size and design of the receiver the line of demarcation between coarse and fine carbon dust can be adjusted to a considerable degree.

The most interesting pneumatic conveying system I know is the one mentioned in the previous paragraph, for carrying atomised lead. It is of special interest because it is, I believe, the only installation in existence for handling a material of such high specific gravity. Atomised lead weighs about 450 lb. per cubic ft., and, in this case, is a black powder ranging in size from the most extreme fines to lumps the size of a pea; the greater part of the powder would pass a 250 mesh sieve.

The problem at this plant was to convey this material from two points to a concrete storage tank or to distributing cars; and also, when needed, to lift material from the bottom of the storage tank and discharge it into cars. The capacity of the system as installed is 10 tons per hour on the short lines and 2 to 3 tons per hour on the long lines. The motor for the high vacuum rotary pump is 40 h.p., and the rotary lock requires about 1 h.p. Owing to the heaviness of the material carried the air filters were eliminated and it was found that only a very small percentage of the extreme fines escaped.

The Prevention of Corrosion

The writer, a well-known metallurgical chemist, reviews the means which are now available for rendering metals non-corrodible. Attention is called in particular to the use of stainless steels and the quite recent progress which has been made with alloys of high nickel and chromium content.

THE protection of iron and steel from corrosion is a problem that has vexed man throughout the ages, but it is a branch of metallurgical science which is now receiving the attention of both the theoretical and practical worker. Let us therefore take a short survey of the subject. A review of modern practice indicates that the methods employed for counteracting this evil are divisible into two main groups. The first of these, which is of widespread application, is to cover the corrodible metal with a protective layer, while the second consists in using an alloy which is less susceptible to attack. The use of such rustless alloys is comparatively modern, and it is undoubtedly in this direction that the most important developments may be expected.

Before considering the different varieties of coatings it is perhaps advisable to point out one common disadvantage—their protective influence is only temporary, and their value depends solely upon the maintenance of a perfect film. Should this become pierced the underlying metal corrodes, and in certain cases, *e.g.*, with a tin coating, this rusting is accelerated by the presence of the "protector." Further, there is the consideration of cases where the application of coatings is useless owing to abrasion, attack by acids, or other influences.

Oxide and Other Coatings

The study of the coatings is best followed by dividing them into two groups, the inorganic, comprising the metal and oxide films, and the organic, which includes the paints and varnishes.

The best known oxide films are those produced by the Bower-Barff process and its modifications. In these the steel is heated in a current of superheated steam to about 900° C., when a film consisting of the red and black oxides (Fe_2O_3 and Fe_3O_4) is produced. Further treatment with producer gas or a hydro-carbon oil reduces the red oxide to the black magnetic one, giving a good protection, particularly to acid fumes. Such treatment, however, is costly and its great disadvantage lies in the fact that it cannot be applied to material which has been heat treated, but for ornamental ironwork it has been widely appreciated. Other processes involve treatment in a fused bath of oxidising salts, for example, sodium nitrate and manganese dioxide; immersion in boiling oxidising solutions, such as sodium hydroxide containing sodium picrate; or electrolysis in baths of widely varying compositions. Probably some of the rust resistance of oxide coatings is due to the fact that they are also oiled to enhance their appearance.

Though not an oxide coating that produced by "coslettising" may be grouped with them since it consists of an iron salt. A hot dilute solution of phosphoric acid containing ferrous phosphate and sometimes manganese dioxide is used, and the articles are immersed until a coating of the requisite thickness is obtained. This gives a tenacious, dark grey coating of ferroso-ferric phosphate which on oiling turns black. The low working temperature involved and its application to small and dimensional parts are great benefits, added to which is its high resistance to atmospheric influences. Of the metals electro-positive to iron, the only ones used for protective purposes are zinc and aluminium; while of those below iron in the electro-chemical series, tin, lead, copper and nickel may be mentioned. The superiority of the electro-positive metals over the electro-negative is obvious; since, after any localised failure of the coating has taken place, an electro-positive layer will still protect the base metal at its own expense, whilst the reverse is the case with an electro-negative skin.

The oldest process for zincing is that of hot dipping, in which the cleaned steel is immersed in molten zinc and then withdrawn with the coating of zinc adhering to it. In the "sherardising" process the articles are heated at about 350° C. in revolving drums packed with zinc dust plus a little zinc oxide; while the "Schoop" spraying process consists in burning zinc wire in an oxy-acetylene or oxy-hydrogen flame and directing the resultant finely divided metal on to the articles to be covered. The electrolytic deposition of zinc is also a process for which extended application may be expected. All these methods have specific advantages and disadvantages; thus hot dipping yields a thick but not very even layer, whilst "sherardised" coatings have a uniform outer skin of pure zinc, but the operation requires careful control. For application to fixed structures the somewhat costly "spraying" process stands alone, and for purity of product and working at low temperatures the deposition method is unchallenged.

"Calorising," a process comparable to "sherardising," gives to steel a coating of aluminium, which due to its thin outer skin of alumina is very resistant to high temperatures and the scaling action of furnace gases. The low fusion points of tin and lead permit their application by hot dipping, but electro-plating is usually resorted to in order to obtain deposits of copper and nickel.

Undoubtedly the method most widely used for protecting structural steelwork is that of painting, but lack of space prevents more than a cursory glance. That the paint should be impervious to atmospheric influences is obvious, and it is claimed in this direction that polymerised oils possess an advantage over untreated vehicles; in addition, the paint must not be so composed that it will aid corrosion. The more well known pigments were recently classified by the American Society for Testing Materials as inhibitors, indeterminates, or stimulators; and it has been further advanced by Dr. Friend that dark pigments are preferable to light coloured ones, since they are less affected by the photo-chemical action of light. The pigments selected should be stable in the atmosphere and the paint should be water-shedding, a property sometimes conferred by the addition of gums. In conclusion, a word may be said about the application of the paint; the metal surface should be dry and unrusted, with no loose scale. Also, greater benefit is conferred by several thin coats, rather than a single thick one.

Resistant Alloys

Of recent years there have been many attempts to prepare alloys which are highly resistant to corrosion, but this is not, as might appear at first sight, an easy matter. Non-corrodibility, though eminently desirable, has sometimes to be sacrificed to other considerations, since factors, such as forging, machining, and a product endowed with the requisite mechanical properties, have to be allowed for. In spite of

this, considerable success has to be recorded, and the future most certainly will reveal still greater triumphs. It must not be inferred that the discovery of any single alloy unaffected by all influences will be made, but that numerous alloys, each resistant to some particular conditions, will be introduced. The most important non-corrosive alloys are the iron-silicon, iron-carbon-nickel, and iron-carbon-chromium members along with monel metal, nichrome, and stellite.

About fifteen years ago M. Jouve showed that cast irons high in silicon were remarkably resistant to attack by acids and this led to the introduction of alloys such as "tantiron," "ironac," and "duriron." These are irons containing 13 to 15 per cent. silicon, with low carbon, manganese, phosphorus and sulphur, and in appearance they are like silvery-white close-grained cast iron. The resistance to corrosion appears to increase with increasing silicon but this rarely goes above 15 per cent. At first great difficulty was experienced in casting such metal; low silicon alloys make good soft castings; above 3·5 per cent. silicon they are brittle, and above 7·5 per cent. there is a tendency to break in the mould. Now these troubles have been surmounted this material is being used satisfactorily for autoclaves, acid pans, denitrating towers, and other parts of chemical plant. Nitric, sulphuric, acetic and practically all commercial acids except hydrochloric and hydrofluoric, do not attack them, and even in the case of hydrochloric acid the loss is of a very low order. They will not, however, withstand the action of fused alkalis. Many of their other properties such as heat conductivity and electrical resistance compare favourably with those of cast iron, but the mechanical strength of these alloys is rather lower, and their extreme brittleness limits their application. In addition to the above properties their resistance to mechanical erosion is not to be despised.

Originally nickel was added to steel for the improvement of the mechanical properties, and this led to a realisation of the fact that the added element, particularly when present in considerable quantities, increased the rust resistance of the steel. The resistance induced by nickel or chromium seems to be an additive property, no extreme changes being caused by the additions, but it is claimed that, by the time the nickel content has reached 18 per cent., an alloy practically uncorroded under ordinary atmospheric conditions is obtained. The 26 per cent. nickel steel has been used for scientific instruments, measuring tapes, and in non-corrodible fittings for automobiles, etc. Steel containing 30 per cent. nickel has proved in practice of great utility for the manufacture of marine boiler tubes; and, as this steel can be easily drawn into wire, it has been used in connection with various ante-submarine devices, where its high tensile strength and toughness, combined with its freedom from corrosion, have rendered it of value. "Invar," containing 35 per cent. nickel is very non-corrodible, and this, coupled with an extremely low co-efficient of thermal expansion, has led to an extended application in scientific instruments for precision work. A promising feature of the nickel steels is their comparative resistance to the action of sulphuric acid. The higher members of this series of alloys often contain as much as 1 per cent. manganese; this is not added to increase the corrosion resistance but to facilitate working operations.

Monel metal is manufactured from a copper-nickel ore mined at Sudbury, Canada, and the metals are present in the same proportions as in the ore. The most usual composition is about 66 per cent. nickel, 30 per cent. copper, with the remainder iron and manganese, but if a casting is required about 1 per cent. silicon is added. The working properties of the material, such as forging, rolling and machining, are excellent, and its mechanical properties, particularly at high temperatures, are amongst its valuable features. The alloy takes a bright finish and is little affected by many reagents; superheated steam, sea-water, alkalis and many neutral solutions do not injure it, but it is not completely resistant to the stronger acids. During heating the material should be protected as the metal is liable to absorb gases, and a smoky flame will carbonise it. Among a few of its applications may be mentioned valves and pump rods.

The series of alloys known as nichromes are prepared by melting with nickel either chromium metal or, more frequently, ferro-chrome. The binary alloys usually contain 15 per cent. chromium when used for resistance wire and 30 per cent. when required for high temperature work; whilst the ternary alloys have compositions ranging as follows:—carbon, 0·5–1·0 per cent.; manganese, 1·0 per cent.; silicon, 1·0 per cent.; chromium, 15 per cent–20 per cent.; nickel, 50 per cent.–70 per cent. with the rest iron. Such alloys combine good mechanical properties both at normal and elevated temperatures with rust resistance to the air, sea-water and many neutral media; but their chief quality lies in the power to withstand for long periods the destructive action of furnace gases at high temperatures. The introduction of small quantities of molybdenum and tungsten to a nichrome gives what is known as Parr's metal, which is useful for vessels to withstand high internal pressures combined with non-corrodibility.

Resistance to Temperature

An analogous series of alloys, in which cobalt replaces nickel, have also been placed upon the market; these are the stellites with a composition approximating to cobalt, 55 per cent; chromium, 31 per cent.; tungsten or molybdenum, 14 per cent. These alloys are brittle and intensely hard, but as they will take a cutting edge and are unaffected by the solutions used in surgery and dentistry (mercuric chloride, phosphoric acid, etc.), they have found an outlet in the manufacture of instruments for these professions. Like the nichromes, these alloys resist elevated temperatures; at first a skin of oxide is formed, but this itself prevents further penetration.

We will now turn to the steel of which everybody has heard, viz.: "stainless" steel, which is an iron-carbon-chromium alloy with a composition approximately carbon, 0·30 per cent.; manganese, 0·30 per cent.; silicon, 0·20 per cent.; chromium, 12–14 per cent. The practical utility of such a material was first realised by Mr. Brearley when in search of a non-erodible steel for use in the lining of guns, and as it was only stainless in the hard condition it was first placed upon the market in the form of cutlery. This led to the mistaken conclusion that this material could not be applied in other directions, but thanks to intensive investigations it is now possible to provide for many long-felt wants. The steel is now supplied in the soft condition, but without any loss of its rustless properties and, if subsequently softened, the cold worked metal is also quite satisfactory. At first an incomplete understanding of the thermal treatment necessary for the best results also caused some dissatisfaction, but it is now fully realised that the steel must be raised to 950°—1,000° C. before hardening. Owing to the readiness with which the steel hardens, small pieces may be air-cooled while larger sections only require oil quenching, and a judicious heat treatment confers upon the steel excellent mechanical properties which are very largely retained at high temperatures. To this maintenance of strength, other advantages such as resistance to scaling and attrition may be added. Of late, this material has found such extended use that a complete list of its applications is impossible, but it does not rust in natural waters, sea water or superheated steam. High amongst its resistance to many organic and inorganic chemicals may be placed its complete immunity to attack by strong nitric acid, but it is dissolved by hydrochloric or sulphuric acids. One point is occasionally overlooked; that is, the surface of the steel must be completely scale-free if complete rust resistance is to be attained. There is little doubt that, in spite of its present rather increased cost, the very excellent combination of mechanical, physical, and non-corrodible properties will result in a greatly increased demand for this material.

In conclusion, the very latest developments in rustless alloys may be mentioned. The recently published work of both English and German metallurgists suggests that these are taking the form of steels with high nickel and high chromium. Thus, Dr. Hatfield, in a recent paper published data showing the very high measure of resistance to sulphuric acid attained by such alloys, and Krupp's are also recommending steels containing approximately 20 per cent. and 8 per cent. of chromium and nickel respectively. At present these products are in their initial stages, but important advances may be confidently expected. However, the conditions for which the existing non-rusting alloys might be adopted are by no means exhausted, and a review of such circumstances by the users of ferrous materials would be well rewarded.

Devices for Mechanical Handling

We give on the following pages an outline of some of the devices for the mechanical handling of material, which, though not exhaustive, indicates the principal problems in both large and small works.

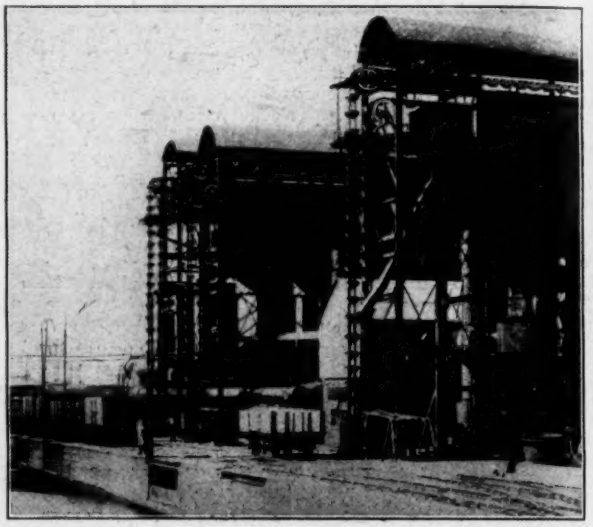
THE advantages of using mechanical methods of handling materials under certain conditions are very widely appreciated but in many cases not very extensively adopted. It is the general practice, for example, in nearly all classes of works to make use of mechanical stoking devices for the boiler furnaces, and it is also not unusual to dispense with manual labour as much as possible in coal handling from truck to furnace. Many of these coal-handling devices are large and expensive to install and have doubtless been responsible for the impression that mechanical handling methods are only practicable when large quantities are to be dealt with. As a matter of fact a large number of devices are on the market which may be used with advantage for dealing with large or small quantities of material with a considerable saving of time and labour.

Conveyors and Elevators

One of the best known and most widely used mechanical devices for carrying materials is the bucket conveyor, which is the logical outcome of the ancient method of handing buckets of water down a line of men. In its simplest form the

TIPPING TRAY CONVEYOR INSTALLED AT A NORTHERN DOCK BY BABCOCK AND WILCOX, LTD., FOR COALING SHIPS.

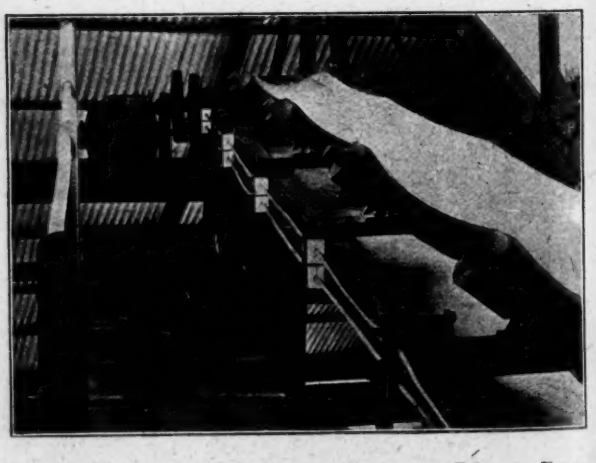
mechanical bucket conveyor consists of a number of buckets affixed to an endless belt or a pair of chains. It is widely used in this form for lifting various kinds of materials to a height so that they may fall by gravity to the points desired. Where it is not required to discharge the materials from the conveyor except at the upper end, this type of conveyor has many advantages, especially as it is self-feeding. If it is used as an elevator, that is, for a vertical lift, it will be seen that it must be run at a fairly high speed in order to throw off the material clear of the downward run before the buckets are inverted. As it is not convenient to deal with heavy loads at high speeds the gravity bucket conveyor has been introduced. In this the buckets are suspended above their centres of gravity between a pair of endless chains, and so always remain vertical, but may be tipped at any chosen point by an automatic device. Gravity bucket conveyors and elevators have been widely adopted for coal handling, and typical installations will be seen in the illustrations, which show large coal-handling plant by Babcock and Wilcox, Ltd.



BABCOCK AND WILCOX GRAVITY BUCKET CONVEYOR INSTALLED IN CONNECTION WITH A GAS POWER PLANT.

The tray conveyor is, in a sense, an adaptation of the bucket conveyor, which is sometimes used for incline work of a heavy nature, flat trays being substituted for buckets.

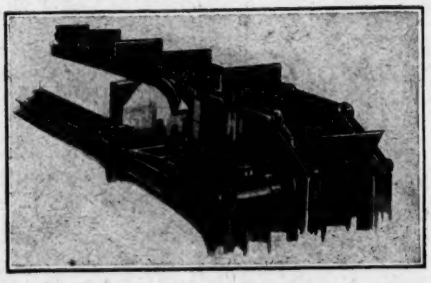
Conveyors are, of course, principally of value where it is desired to transport large quantities of material continuously to a given point. One of the simplest forms is the band conveyor, which is particularly adapted to carrying chemicals in bulk, as the leather or rubber composition beltings used are not so liable to be affected by corrosion as are the necessary metal parts on chain-operated bucket or tray conveyors. The belt cannot, of course, be used to carry material up slope steeper than about 20 degrees, nor is it self feeding. On the other hand, however, "ploughs" or "throw-offs" may be arranged so that materials may be removed from the belt at various predetermined points. Usually the run of these belts is taken over idle rollers so shaped that the belt is rendered slightly concave, allowing heavier loads to be carried. A good



DRIVING MOTOR AND GEARING AT DISCHARGE END OF BELT CONVEYOR BY THE PATERSON HUGHES ENGINEERING CO., LTD.

example of the detail work in belt conveyors will be seen in the illustration, which represents an installation by the Paterson Hughes Engineering Co., Ltd., Glasgow.

Among the variations of the continuous band or chain conveyors the drag or push conveyor may be referred to. In this the roller chains carry flat plates which convey the material along against a flat surface, so that level or almost vertical runs can be used. There are also various types with wooden facings

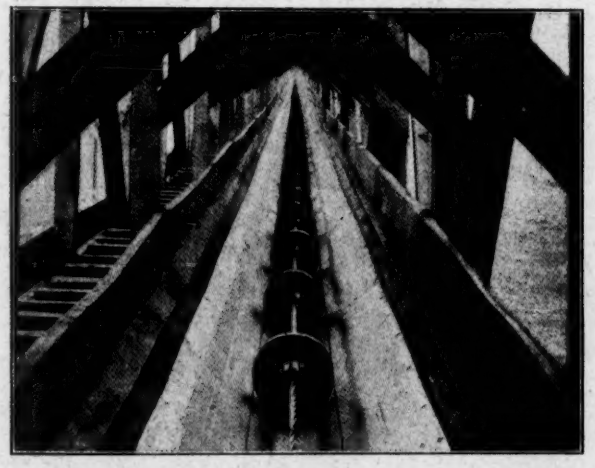


DRAG OR PUSHPLATE CONVEYOR. INSTALLATION BY THE PATERSON HUGHES ENGINEERING CO., LTD.

for carrying goods, known as apron conveyors, which are specially suitable for handling cases and containers of finished products. These usually are adapted to heavy work, and if provided with suitable "cleats" at intervals it is capable of carrying almost any kind of load up or down quite steep inclines if required. Roller chains are again generally used to carry the wooden slats forming the conveyor.

The number of varieties of continuous conveyor is very large, and further examples might be mentioned at some length. Two interesting forms, however, are worth notice, as they are adaptable to powdery and dusty materials, it being possible to enclose the conveyor entirely in a tube of wood or metal. The first of these is the cable conveyor, which consists of a single endless cable with a number of discs at intervals along it, which push the material along in a trough or tube. A special and peculiar form of wheel is required for the cable to pass over at the ends of the run. The other type which may be totally enclosed is the worm or Archimedian screw, a well-known device, which has the advantage of requiring no return of any kind, and thus effecting a considerable saving in space.

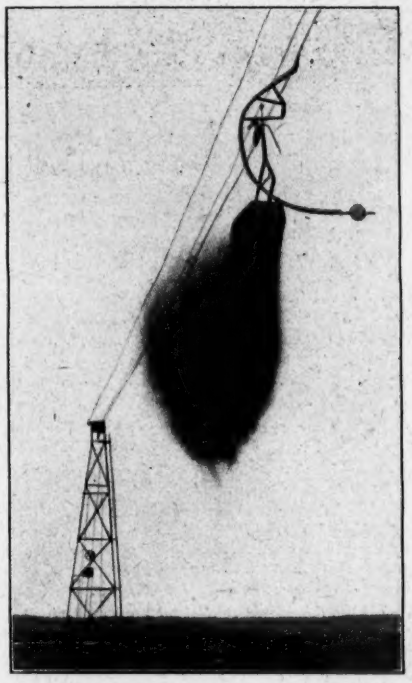
Most manufacturers of conveyors make portable types, such as that illustrated on p. 570, which are adaptable to a wide range of uses, such as loading or unloading railway trucks or road lorries, stacking materials in heaps, etc. Examples of this type have been constructed of brass for dealing with corrosive chemicals.



JEFFERY CABLE CONVEYOR.

Telphers and Ropeways

It is sometimes very desirable in arranging transport about works to keep the ground space as free as possible, and in these cases one of the forms of overhead railways or ropeways is invaluable. The telpher or mono-rail plan, which is well known, consists virtually of a trolley suspended from a heavy rail carried on overhead brackets. These brackets may be fixed to walls or existing supports, but are more usually carried on substantial specially-erected supports. Though in simple arrangements the trolleys may be moved along by the use of poles, the employment of an electric motor on the trolley itself is usually resorted to. The particular advantages of the overhead railway are that awkward corners are readily negotiated, surface erections are not interfered with, and obstacles such as canals, roadways and railways are readily



AERIAL ROPEWAY INSTALLATION, BY R. WHITE AND SONS, OF WIDNES, DISCHARGING ITS LOAD AUTOMATICALLY.

crossed. It is usual to have some means of raising and lowering the load, as then the railway can be carried at a convenient height above the ground so as to clear the various obstacles. This lifting gear is also commonly electrically operated.

The overhead ropeway has the advantage of costing less to install, and possesses several of the same points as the telpher railway, particularly in the ease with which obstacles may be passed over. In addition much longer spans can be used between the supports, and the whole of the erections are lighter because the power unit is not carried on the rope. There is, however, a difficulty in arranging curves and branch lines. With some types the carriers have to be slipped off the moving rope at curves, on to another rope, which requires the supervision of a man in case any of the carriers should lag in spite of the automatic devices for the shunting process. With the more generally adopted type, in which the carrier runs on a stationary rope, curves can be negotiated automatically, but a somewhat large specially constructed standard has to be used. Automatic tipping of the load at predetermined points is readily arranged. Ropeways are thus generally adopted where transport is required for some distance in a straight line, such as in disposing of waste material in dumps, but they may be used with advantage for transporting general materials across obstacles such as water-ways, in carrying

chemical materials loose in bulk to dumps for storage, or for handling ashes and furnace waste.

JEFFERY PORTABLE CONVEYOR, OF THE WOODEN SLAT TYPE.

Trucks and Trolleys

The use of trucks and trolleys running on rails is considerably older than railways proper, and at the present time there is a very large variety of narrow-gauge trucks adapted to special uses, some being arranged for discharge at the ends, sides or underneath. An external form of power is required, either in the form of locomotives of some kind, cable haulage, or man-power, according to the volume of work done. Truck hauling is, of course, slow compared with the continuous conveyors we have considered so far, but it is adaptable to much more varying conditions with a given outlay, another advantage being that the sphere of effectiveness can easily be increased by laying down more track.

While considering trucks it is worth mentioning that handling costs both on rail and road is greatly reduced in many cases by the use of trucks with end or side doors which can swing open to discharge the load by simple tipping, or by lorries arranged to tip in various directions, such as the "Super-Sentinel" waggon illustrated below. Some ingenious devices have also been made to turn the ordinary railway truck bodily into an inverted position, so obtaining a quick discharge from ordinary trucks. One of these is illustrated on another page in this number and one on the opposite page.

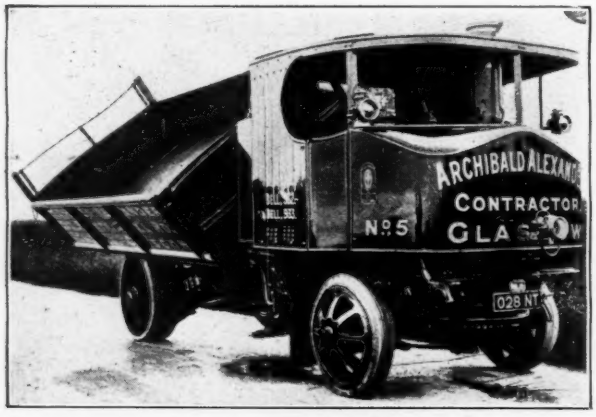
One of the most useful devices ever introduced to avoid undue handling of material is undoubtedly the lifting truck. This is in effect the wheels and axles of a trolley with a suitable framework, but without the usual platform. The goods to be moved, drums or barrels containing chemicals, carboys, etc., are placed on special small platforms as soon as they are received and remain on these as long as they are in the works. When it is desired to move them the lifting truck is simply run under the platform and by means of the operating mechanism the platform is lifted with the goods in position and the whole wheeled away as a normal trolley to whatever point is required. The platform is then readily removed and the truck quickly released for other work. Besides obviously saving time and labour in man-handling the containers or other objects being transported, there is a very considerable saving by reducing the wear and tear and risk of damage to the container itself, which is not touched at all. For these reasons the introduction of lifting trucks in almost any works will effect considerable economies, and the advantages in this way can be equally appreciated in large and small works.

AJAX" TRUCK IN LOWERED POSITION.

There are many forms of lifting trucks on the market in the simpler of which the lift is obtained by a long lever to be depressed by the operator. In other types there is a ratchet and screw operated by levers, which have the advantage that a greater lift can be obtained and heavier work dealt with at the expense of a certain amount of rapidity in handling. Many trucks designed for heavy work have hydraulic and oil brakes, etc., to take the load. Good examples, whatever their size, can be equally readily pushed and pulled, and are fitted with three axles, the wheels on the central one being slightly lower than the others, so that the truck can be readily turned in and out of awkward corners. Our illustration shows the "Ajax" truck, by Goodall and Hatton, which is a good example of a simple, light type with many practical features.

"AJAX" TRUCK IN RAISED POSITION.

A recent development in trucks for use about works is the electrically propelled type, designed to run where desired without the use of rails. These are very convenient and flexible where there are suitable arrangements for recharging the accumulators. By means of such trucks a train of considerable length, composed of trolleys fitted with special couplings to ensure proper following-on, may be operated on the level about awkward corners in the works and yard. An adpatation of the electric truck is the electric movable crane which can operate extraordinarily heavy loads in confined situations and transport them readily from one part of the works to another. A crane of this type was described in THE CHEMICAL AGE of February 17, 1923, introduced by Ransomes, Sims and Jefferies, Ltd., of Ipswich, and available in different sizes for different loads.



"SUPER-SENTINEL" STEAM WAGGON WITH 3-WAY POWER-OPERATED TIPPING BODY.

Equipment at a Chemical Works

As an example of a very complete equipment for the mechanical handling of chemicals, we may mention the lay-out in the packing rooms of The British Drug Houses, Ltd., illustrated on the opposite page by permission of the firm. Here various preparations, such as salts, are packeted for retailers. In the case of crystalline salt the material is fed to a bin, whence it is carried above the working bench by a miniature bucket elevator, consisting of buckets affixed to canvas belting and electrically operated. Thence the material descends by

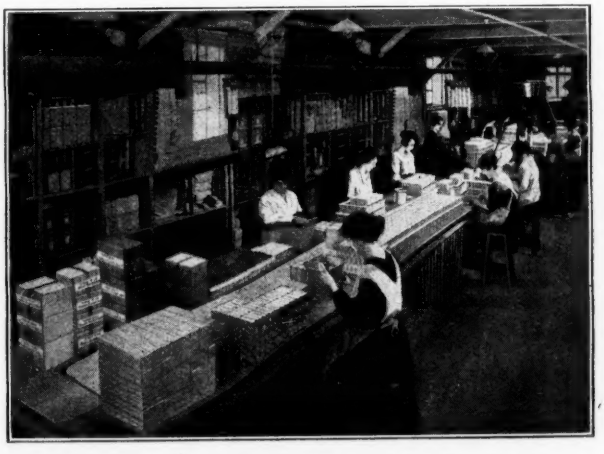
BABCOCK AND WILCOX GRAVITY BUCKET AND TIPPING TRAY CONVEYORS, WITH HYDRAULIC RAILWAY TRUCK TIPPING APPARATUS, INSTALLED AT A MIDLAND GAS WORKS.

gravity to an automatic foot-operated weighing machine, where a girl weighs it out in a predetermined quantity into the preliminary wrapping and places it on the slow moving canvas belt which runs down the centre of the bench. It is thus carried to further operators, who successively complete the wrapping and labelling, and finally put up the packets into boxes for dispatch.

The same firm have an interesting application in the handling of chemicals in bulk. Here salts which have been recrystallised are sent through a hopper to the floor below the crystallising tanks, where the damp salt is collected and dried in a centrifuge. The dried salt is then lifted by a vertical bucket conveyor to a point well above the level of the crystallising tanks, and falls to a lower floor ready for the next operation, after which it descends once more to the original level direct into the casks or sacks in which it is sent out. The whole arrangement represents a very considerable saving of space, time and labour on the methods formerly used.

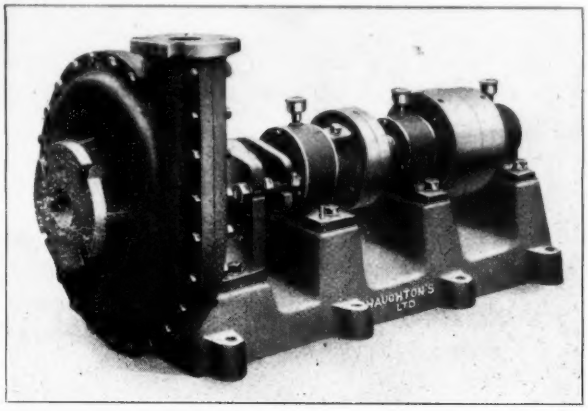
The Handling of Liquids

Little has been said of the problem of handling liquids, which is one of the very first importance in a chemical works, and deserves a series of articles to itself. The chemical engineer, however, from the very insistence of the question is not likely to be forgetful of the importance of various devices which have been introduced to overcome his special problems. Handling liquids manually implies some such rudimentary process as baling which is obviously inefficient, but nevertheless there are numerous instances where liquids are handled



MECHANICAL HANDLING INSTALLATION AT THE WORKS OF BRITISH DRUG HOUSES, LTD., LONDON.

in drums and carboys when they could be much more conveniently dealt with by a system of pipes and storage tanks. Liquids, unlike solids, are not damaged by falling under gravity, so that so far as arranging transport of liquids about a works in a pipes-system the problem resolves itself into a consideration of the means of raising the liquid to the required height, either from a low-level storage tank to a distribution tank, or from the vessel in which it is actually produced. There are in general two means of lifting liquids, either direct with various forms of pumps or pneumatically by vacuum or compressed air. The principal difficulty is that many chemical liquids are highly corrosive, and while it is comparatively easy to design pipes and tanks which are resistant to corrosion,



HAUGHTON CENTRIFUGAL PUMP FOR SULPHURIC ACID, LIFTING 20 TONS PER HOUR THROUGH A HEIGHT OF 95 FEET.

pumps with their moving parts present greater obstacles, which have, however, been tackled successfully by various makers. For such corrosive substances, and where pneumatic methods are not convenient a high-speed pump of the centrifugal type, such as the one shown in the illustration, is the most suitable.

In the preparation of this article we are indebted, particularly in the matter of illustrations, to the courtesy of the following firms:—Babcock and Wilcox, Ltd., The British Drug Houses, Ltd., Goodall and Hatton, Ltd., Haughton's Patent Metallic Packing Co., Ltd., The Paterson Hughes Engineering Co., Ltd., R. White and Sons, and Hugh Wood and Co., Ltd. (sole agents in Great Britian for the Jeffery Manufacturing Co. of U.S.A.).

Effect of Manganese on Plant Growth

CERTAIN elements that occur only in very small amounts in plant tissues would appear to play some definite part in the economy of the plant. J. S. McHargue (*Journ. Agric. Research*, xxiv. pp. 781–794) has investigated the effect of manganese sulphate on the growth of plants in water cultures with specially purified nutrient salts, and his results indicate that at least for the plants tested, a very small quantity of manganese is essential to produce normal growth. Such plants as radish, soy bean, cow-pea, field pea, and maize do not contain sufficient manganese for growth to maturity, though some have sufficient to maintain a normal development for the first few weeks. In the latter case experiments carried on for too short a time fail to reveal the essential nature of manganese. The lack of manganese affects the production of dry matter and brings about an etiolated condition of the young leaves and buds, suggesting that the element has a function in photo-synthesis and in chlorophyll formation. Experiments carried on in soil showed that manganese sulphate applied to acid soil caused a decrease in crop, whereas if calcium carbonate was applied in addition to neutralise the acidity increased yields were obtained. Soluble salts of manganese in acid soils may therefore be one of the causes of toxicity in such soils as exhibit toxic effects, an excess of manganese sulphate rendering a soil more or less sterile with respect to the growth of plants.

A New Source of Potash

Italian Leucite and Its Products

PROFESSOR J. W. HINCHLEY, at the first meeting of the session of the Chemical Engineering Group of the Society of Chemical Industry, which was held at the Chemical Industry Club, London, on November 16, gave some interesting details of a new source of potash in the lava deposits of Italy. Mr. J. Arthur Reavell (Chairman of the Group) presided.

Professor Hinchley said that, as was well known, the position before the war was that the world's potash supplies came mainly from the German Stassfurt mines, which supplied 95 per cent. of the total production, the remaining 5 per cent. coming from the Alsace mines. That state of affairs practically still continued. The total output of potash was probably in the neighbourhood of one million metric tons per annum, and, having regard to the large proportion of this which was produced by Germany, it was necessary that we should find as many other sources of potash as possible. The igneous rocks of the earth's crust contained approximately 3 per cent. of potash, and some of it contained as much as 10 per cent. Unfortunately, a large number of these igneous rocks are not very amenable to industrial application, but in Italy there is a source of potash which is amenable to industrial application in such quantities that the world's demands for many centuries can be met. The mineral itself is leucite, which is said to occur in many parts of the world, but as a rule it occurs under conditions which do not enable it to be utilised readily in industry, whereas the leucite of Italy occurs in such a form that it is readily available for industry. Pure leucite contains 21·5 per cent. potash, 23·5 per cent. alumina, and 55 per cent. silica.

The particular district with which Professor Hinchley dealt was the Rocca Monfina district, from which it will be easily possible, by means of a telpher system, to load ships at the coast, 12 miles away, so that the problem of shipping in 5,000 ton lots to this country will not be a difficult one.

Electro-magnetic Separation

The mineral is crushed, and is separated electro-magnetically at a very low cost; when crushed into a fine powder it is useful for many purposes. Dr. Voelcker, for instance, has been experimenting with it for a year or two as a fertiliser, and has found that powdered leucite is practically equivalent to soluble potash of the same composition for fertilising purposes. This leucite, in a powdered form, being a form of zeolite, is also useful for the purposes of water softening. The exploitation of Italian leucite is largely due to an Italian, Baron Blanc, who, during the war, tested samples of the deposit from the point of view of making them a commercial proposition. As a result he has developed the potash industry in Italy, and the Societa Italiana Potassa is now in operation.

One of the important features of leucite, and one in which it differs very much from other silicates, is the fact that it can be dissolved in acids without obtaining the gelatinous silica which is the bugbear in dissolving ordinary silicates. If leucite in a granular form is treated with acid, practically no gelatinous silica is formed, but if it is treated in the powdered form, gelatinous silica is formed to some extent. The treatment of the granular leucite is to place it in a suitable vessel and circulate the dissolving acid regularly through the granular mass, which acts as a filter for the gelatinous silica and retains it. A simple circulating apparatus for this purpose could easily be made, but the process itself is not quite so simple as it might at first sight appear. Treating leucite with sulphuric acid one obtains potash alum without any residue, and a plant for producing alum in this way is actually at work at Pierre Beniti, near Lyons, in France. From 4 tons of leucite it is possible to obtain 6 tons of alum, and Professor Hinchley understands that the cost of the production of alum in that particular plant is only a little over £4 per ton.

Treatment of the Silica Residue

Apparatus for the removal of the silica by sulphuric acid can be made in many different ways, and there is no difficulty in removing it by manual labour, or better, by a steam ejector. The silica contains a large proportion of gangue, which is not all acted upon by acid. It has been proposed to pass the silica through rubber rollers, to dry it, and blow a current of air through it, and in that way the whole of the silica can be removed, leaving behind the larger particles of original gangue. The silica which remains behind, like leucite, has some marvellous chemical characters, and the most important is that it is capable of being attacked at once by caustic soda or caustic potash, even when very dilute, with the formation of sodium silicate. The caustic soda is placed in a vessel provided with an agitator, and the silica is added slowly while stirring. Since the action is exothermic, the temperature rises considerably, and there is no difficulty in producing a hot solution of silicate of soda, which can be allowed to stand a short time for the separation of any gangue if the crude material has been used. This can be passed through a filter press, and an absolutely colourless, clear and transparent solution of sodium silicate is obtained, a very much purer material than that very often sent out. The cost of sodium silicate made at the Pierre Beniti works is £2 9s. per ton, 40 Beaumé, 1·38 specific gravity.

The Production of Potassium Chloride

The next process, which is not at work at the moment, but has been at work at Cengio, in Northern Savoy, is the hydrochloric acid treatment. This is very similar to the treatment with sulphuric acid, except that in this case one can use a gas. The hydrochloric acid process, which has been at work at Cengio, is due to Baron Blanc and Felix Jourdan, and by this process it has been possible to get practically pure potassium chloride, pure hydrate aluminium chloride, or, alternatively, aluminium oxide, hydrated, and silica. The gelatinous silica is not soluble in hydrochloric acid, but behaves exactly in the same way as in sulphuric acid, the circulating process avoiding the formation of a gelatinous silica. The plant in this case consists of a short stoneware tower, in which the leucite is placed, and the solution is circulated continuously through the leucite. The number of circulations required is very small for the removal of the gelatinous silica. In his opinion, said Professor Hinchley, the rate of circulation in use when he saw the plant might have been enormously increased, but there was some difficulty in pumping hydrochloric acid. Just as in the alum case, it is possible to work the process with mother liquors, so that, during the cooling stage, the temperature rises in the same way to 90° C., and, if it were arranged that the charge was saturated with potassium chloride at 80° C., and cooled down to 20° C., the whole of the potassium chloride obtained by the action of the acid on the leucite could be crystallised out. A careful calculation has shown that 2 cubic metres of liquid is required for every ton of leucite treated. The potassium chloride precipitated at that stage is generally yellowish in colour, but, by washing with washing waters from previous operations, it can be got as a white potassium chloride. He understood that there was a very large plant at Cengio for manufacturing the alum for this process, and that it will be at work in the course of next spring at Bussi, whence it has been removed.

The next problem, having got all the potash out, and the aluminium chloride in solution, is to take advantage of the fact that, if a solution of hydrochloric acid and aluminium chloride is saturated and precipitated with 12 molecules of water, a rise of temperature takes place which is not disadvantageous, because the removal of the 12 molecules of water by the precipitation might precipitate the potassium chloride, but a rise of temperature takes place upon the addition of the sulphuric acid and keeps the potassium chloride in solution. The residual liquor then is used for a further attack on the leucite. It is possible to use the method of passing the aluminium, before precipitation, through a bed of leucite, which is a cheap material, and in that way get rid of the iron impurity entirely, and obtain a perfectly white precipitate of aluminium chloride. This aluminium chloride contains water, so that it cannot be used for this purpose where anhydrous aluminium chloride is required, but it can be used as a mordant. Aluminium is not attacked by hydrochloric acid when the temperature is over 180° C., but, by passing it through a tube at 300°, a fine white aluminium oxide, which is hydrated, is obtained. That is a pure material, and it should be borne in mind that in its production no filter press has been used. The ordinary method of making pure aluminium oxide generally involves this, and therefore the cost of this material, without using the filter press, is very low; it could be obtained hydrochloric-acid-free and iron-free, and the removal of the

further amount of water, so that it can be added to aluminium furnaces, presents no serious difficulty.

In treating one ton of leucite, 619,000 calories of heat are given out, and this has to be dissipated to a large extent, or it may be used for heating wash waters, but, in treating aluminium chloride, which requires heat—an endothermic reaction and not an exothermic reaction—139,000 calories are applied for the purpose.

In conclusion, Professor Hinchley said that in leucite we had a material which the chemical industry of this country could not afford to neglect, and he expressed the hope that before long he would be able to give the second part of the paper, with a description of the plant in use.

A discussion followed, to which Dr. W. R. Ormandy, Dr. Voelcker, Dr. F. P. Schotz and Dr. E. H. Tripp contributed. In reply to the points raised, Professor Hinchley stated that there are not any suitable leucite deposits in this country for potash production, and that the cost of potash salts from Italian leucite for agricultural purposes was half the cost of kainite or silvinite, with their methods of production depending on evaporation, and that the leucite deposits had been jealously watched by German interests before the war. Interesting samples were shown of the mineral in different stages and the pure alum and potassium chloride produced.

British Empire Exhibition, 1924

To the Editor of THE CHEMICAL AGE.

SIR,—It is well known to most people that at the forthcoming Exhibition next year at Wembley there will be shown a very complete representation of our present state of knowledge of natural science. The details of the arrangements perhaps are not so well known, and with a view to furnishing information to those already interested, and possibly enlisting the assistance of those who have not already offered it, I shall be glad to be allowed to make the following statement.

A Committee of the Royal Society is dealing with an exhibit illustrating, so far as space permits, researches in various branches of pure science other than chemistry.

The Chemistry Exhibit is being organised by a committee of representatives of all the other scientific societies dealing with science and application of chemistry. The two committees are working in the closest possible co-operation, having three members in common in order to prevent overlapping.

The space at the disposal of the committees is limited, but those who are able and willing to assist in the Chemistry Exhibit should communicate with Dr. Levinstein, at 166, Piccadilly, W.1, or any of the conveners of sections whose names are given below.

Subjects which are on the borderland of Physics and Chemistry, such as the Structure of the Atom, the Inner Structure of Crystals and recent Spectroscopic work will be dealt with by the committee to which it is most appropriately referred. Arrangements will be made between the two committees to exhibit the work in its most appropriate place.

When the keys of the Palace of Industry were handed over by the contractors to the Exhibition authorities on November 12 it was noticed that Messrs. Gaze and Co., contractors, of Kingston-on-Thames, had already commenced their work on the Chemical Hall within the already completed Palace of Industry.

The next meeting of the committee is to be held on December 19, and it is hoped that prior to this date sufficient information will be in the hands of each convener to enable him to make a close estimate of the amount of space he will require and the expenses which will be incurred in his section. It is essential that this date be adhered to if the subsequent work is to be efficiently carried out.

The idea of having standard specimen bottles has been abandoned, and specimens will be shown in exhibitors' own bottles, except in special circumstances. The importance of the Scientific Exhibits has already been well recognised by the technical press, and I am, therefore, encouraged to hope that the widest publicity may be given to the details of the arrangements which have already been made.—I am, etc.,

W. J. U. WOOLCOCK.

Association of British Chemical Manufacturers,
166, Piccadilly, W.1.
November 21, 1923.

"Don't be Decimal, Darling"

To the Editor of THE CHEMICAL AGE.

HE: It's ten.

SHE: Ten? Ten what? Millimetres or something? It can't be ten anything in English. Don't be decimal, darling.

HE: It's ten o'clock. The train goes at 11.15.—*Rookery Nook.*

SIR,—Need we take "Research men" or even the Americans seriously? Are not "the men in charge of the process" and people generally those to be most considered? Should not the "Research men" be forced to think a little sometimes; is it not their job to help those whom they "sniff at," too often, as thoughtless and unable to think—their way? If this decimalised class wish to get up in the world, must it not think up to the level of the public rather than force others down to its own low and limited decimal level?

As to the Americans being in charge of the Bird o' Freedom, they necessarily exist but to standardise everything. After travelling around the American continent, several years ago, I came home and wrote a book-review, in which I referred to the "boys" as all wearing one suit and to the "girls" having but one pair of stays between them; in these jazz times, I believe "the without" is preferred, so perhaps figures are not now all alike. However, everyone must "horn" his eyewear. When in New Orleans I seemed to be regarded as a criminal, as I continued to keep a Panama on my head after the appointed date, the weather being blazing hot.

Still, the turned-up-trouser-hem has overcome us, in common with the rest of the world; it is more "ketching" than any other infectious disease. Otherwise, no two of us, thank Heaven, strive to dress alike, if we dress at all; the Research men, unfortunately, are fast losing the habit, so are not only characterised by being decimal; this is sad, as dress is the one sign of distinction and individuality left to us—our one hope for the future.

Man is built to halve and quarter—he can do it with a piece of string or by distributing his goods equally on the two opposite ends of a see-saw. As to decimal peoples, I was walking through a Paris market, a few months ago, with that occasional traveller, Sir William Pope; the half-kilo was priced everywhere—not 0.5 Kg.; this led him to remark on the way in which the French did not decimalise, in common life.

What about the point in 11·15? The fact is decimals are good for the delicate darlings who are confined to laboratories and have simple sums to do; their masters, the public, don't hanker any way after them. When do our schools teach decimals—are these not usually counted with extras—as a cult apart? Don't let us be highbrow humbugs and talk about weights and measures affecting world peace and progress; the Dr. Marie Stopes's must first breed a little common sense into politicians—then, common measures may be possible. Yours—once down among the Research men but now up in the common herd,—

HENRY E. ARMSTRONG.

Commercial Travellers' Votes

To the Editor of THE CHEMICAL AGE.

SIR,—May we, through the medium of your correspondence column, make an appeal to all your commercial traveller readers and, in particular, to non-members of any of our 90 branches, to make every effort to record their vote at the General Election? By reason of their extensive travelling and first-hand knowledge of our various industries and trading conditions their votes are important. It is confidently hoped that all employers will allow their outside representatives every reasonable facility to carry out the duty of every citizen to vote.—Yours, etc.,

L. H. EYRES.

United Commercial Travellers' Association of
Great Britain and Ireland,
69, Sisters Avenue, S.W.11

Candles Ltd.

A COMBINATION of the interests of Lever Brothers and several oil companies, including the Shell Company and the Asiatic Petroleum Company, and their associates, has been formed to develop the candle-making industry on a large scale. A company under the name of Candles, Ltd., incorporates the various interests, and has a capital of £8,500,000.

British Sulphate of Ammonia

Mr. Milne Watson's Review of the Year

AT the annual general meeting of the British Sulphate of Ammonia Federation on Friday, November 16, Mr. D. Milne Watson, the chairman of the company, reviewed the business of the year in considerable detail.

In spite, he said, of the political troubles on the Continent, the average price for last year was about 10 per cent. higher than for the preceding year. Although it must be remembered that this rise followed on a fall of no less than 41 per cent. from the level reached in 1920–21, yet the better price obtained for last year undoubtedly helped to stimulate the general revival in the coke-oven industry and probably prevented many small gas undertakings from throwing their ammoniacal liquor to waste instead of making it into sulphate of ammonia.

High Cost of Sulphuric Acid

Nevertheless, we are still suffering from high costs of production, and, in particular, from the high price of sulphuric acid. Before the war, sulphuric acid could be bought at 25s. per ton; the very lowest price at which acid is now being sold, as far as I am aware, is 55s. per ton—120 per cent. more than the pre-war figure. Most of you, however, are still paying 60s. per ton—140 per cent. more—and many large consumers are still being asked 80s. per ton in some districts. An examination of the cost of materials and labour required to make acid would not appear to justify a selling price so much greater than the pre-war price. I feel bound to add, however, that the National Sulphuric Acid Association have made us a very fair offer to go into this question of costs with them.

Our production last year was about 50 per cent. larger than for 1921–22. Our total exports show a gain of 58 per cent. and home deliveries an increase of 3 per cent. on the previous year. This expansion in trade is, I think, very satisfactory, and as we know that there has also been an increase in the quantity used in America, we can say with confidence that the demand for sulphate of ammonia is steadily increasing year by year. The sulphate of ammonia problem is apt to look a small one, compared with nitrate of soda. That is because all, or nearly all, the nitrate is made in one country. The total quantity of sulphate of ammonia available for export from countries in which the whole production is not consumed is under 450,000 tons at present, whereas exports of nitrate of soda from Chile are of the order of 2,300,000 tons per annum. This statement of the position altogether obscures the fact that the total production of ammonia salts in the world is now well over 2,000,000 tons, three-quarters of which are consumed "at home," only the balance being available "for export." It also leaves out of account the fact that during the last decade there has been an increase of no less than 53 per cent. in the world's consumption of sulphate of ammonia, and that notwithstanding a considerable expansion in the production of cyanamide and other newer forms of nitrogen.

Improvement in Quality

The increase in exports of 58 per cent. following after a year in which we had experienced very severe competition from America, is, I believe, very largely—I might almost say entirely—due to the remarkable improvement in the quality of our output. About 70 per cent. of our production is now of acid free or neutral quality, and can therefore be sent to the most distant parts of the world without fear that there will be loss in weight on arrival due to rotting of bags. What is possibly of more importance is that it will arrive in a condition ready to be put on to the land. We have been able to trace an immediate result of the adoption of this high standard of quality in markets like Japan, which in the last two years seemed to have been altogether lost to us. The full effect of this recapture of markets will be made apparent in next year's export figures, and we are making no empty or boastful claim in the report in stating that we have set a standard of quality which is attained by few and surpassed by none of our competitors.

The fact that we have been able to increase our home sales in a year which is generally admitted to have been disastrous for farmers, is a tribute to our propaganda work. We have made an arrangement to do joint propaganda with Buxton lime firms, and the price of lime has been reduced. All agricultural authorities are agreed that British farmers use far too little lime. Our propaganda offices in Spain, Canary Islands, Portugal, Egypt, and Italy are doing educative work framed to suit the conditions obtaining in those countries; we have made special arrangements in Japan and Java, in order to develop consumption in those important consuming countries; we are co-operating with the propaganda organisation in France; and we have in view large schemes of expansion in the Far East.

Although the volume and scope of our operations increases year by year, we are keeping a strict watch over our expenses. I was amused, as well as annoyed, the other day, to hear that one of our critics had remarked: "Ah! yes, the Sulphate of Ammonia Federation has expansion on the brain, and, as a result, their cost of administration is now about 55s. per ton. That is a statisticological inexactitude. Our cost of administration last year was, not 55s., but 1s. 4d. per ton—a reduction of 6d. per ton on the previous year. We hope the figure will be further reduced this year. Our cost of propaganda last year was 1s. 5d. per ton—and we are going to ask you to vote a sum equal to about 1s. 7d. per ton for this year. That makes a total of about 2s. 9d. per ton for administration and propaganda.

Makers Still Outside the Federation

Notwithstanding the manifest advantages which our organisation has to offer, there are still just a few makers in England—whose aggregate production does not amount to 10 per cent. of the total output in Great Britain—who have not yet been able to make up their minds to join us. One of them has paid us the compliment of setting up a propaganda organisation very similar to our own. We honour them for it, but we think we do the work cheaper. As regards these outside firms, we feel that it would be only fair that they should share the small expenses of working the Federation, especially its propaganda expenses. Moreover, the Federation is giving an advantage in price to the home market, and we again think it would be only fair that this subsidy should be borne by all makers. Refusal to share in this expenditure for the increase of consumption is the meanly wise and greatly foolish policy which has given the Americans and the Germans a lasting supremacy over us in certain trades. I say to British manufacturers—if there is an efficient association or federation in your trade, join it; if there isn't, create it.

I was able at our last meeting to announce a notable accession to our strength in the membership of Synthetic Ammonia and Nitrates, Ltd. I am sure we all congratulate them most heartily on having reached the producing stage, and we are glad to welcome Colonel Pollitt as a member of our council. I have another piece of good, and, I think, very significant news for you to-day. That is, that Canadian producers of sulphate of ammonia representing a large proportion of the total output in that country have decided to throw in their lot with us and have joined the Federation.

The meeting re-elected Mr. D. Milne Watson (the Gas Light and Coke Co.) chairman, and Mr. E. J. George (Consett Iron Co., Ltd.) and Mr. A. K. McCosh (William Baird and Co., Ltd.) vice-chairmen for the ensuing year.

The Patent Hygienic Strainer Co.

Meeting of Creditors

THE creditors of C. M. Hargreaves and A. E. Minchin, trading as the Patent Hygienic Strainer Co., 163, Fleet Street, London, E.C., met on November 19, when it was reported that the liabilities amounted to between £1,700 and £1,800, while there were practically no assets except a patent which, if developed, and the creditors would stay their hand, would eventually pay 20s. in the £. The business was only started about 13 months ago, with a capital of £300, but further moneys had been put in since then. One creditor had obtained judgment and had put a petition on the file for bankruptcy. Mr. J. H. Carter, solicitor, said that negotiations had been pending for the disposal of the patent, and he had received an offer in writing. It was resolved that the meeting stand adjourned for six weeks to enable the debtors to dispose of the patent, and that in the meantime no proceedings should be taken against the firm and no further liabilities incurred.

Society of Dyers and Colourists

Calendering and Beetling

MR. WILLIAM MARSHALL, F.I.C., presided over the fourth meeting of the Manchester Section on Friday, November 16, when a paper on "Investigation into the changes which occur in Cotton Fabrics during Calendering and Beetling," by Messrs. J. Huebner, M.Sc.Tech., F.I.C., and V. Malwin, M.Sc.Tech., was read by Mr. Huebner.

The authors had investigated the changes which occur in cotton fabrics during calendering and beetling, and had found that hot calendering resulted in an increase in the ripping strain of the fabrics, while the tensile strain decreased. Hot calendering on one of the fabrics, after impregnation with a 10 per cent. starch paste, produced similar results as regards the tensile strain, but the increase in the ripping strain was less and more regular in the starched than in the unstarched fabric. Another starched fabric, however, showed an increase in both the ripping and the tensile strain after calendering. Cold calendering also increased the ripping strain, but it did not affect the tensile strain. Beetling was responsible for a very considerable increase in the ripping strain, while the tensile strain remained practically unchanged. Embossing of both unstarched and starched fabrics increased the ripping strain, but the decrease in the tensile strain of the unstarched fabric was greater than that which resulted from ordinary hot calendering. The tensile strain of the starched fabric, however, was less affected than that of the unstarched fabric. Immersion of both the calendered and beetled fabric in a weak solution of iodine in potassium iodide and water showed that the amount of iodine absorbed by the fabric increased gradually with prolonged calendering and beetling. The colouration of the fabric produced by the iodine also became darker after prolonged calendering and beetling. Exposure to the air of the fabrics which had been immersed in the iodine solution showed that while the untreated fabric was of a light bluish tinge, the heavily calendered and beetled fabrics were tinted a pale blue. After prolonged exposure to the air the blue colouration disappeared from all the fabrics, but the fading proceeded less rapidly the longer the fabric had been calendered or beetled.

A Transaction in "Milton" Shares

Judgment for the Company

IN the King's Bench Division on Wednesday, November 21, the Lord Chief Justice and a special jury heard an action by the Milton Manufacturing Co., Ltd., of Bunhill Row, London, against Mr. William Dick Forbes, of Pinners Hall, London. The plaintiffs who are the manufacturers of a disinfectant called "Milton" sued the defendant for £6,800 which represented the balance of the price of 12,500 £1 preference shares in the company with interest. Mr. Forbes counterclaimed for a rescission of the agreement to purchase the shares alleging that he purchased them because of misrepresentations made by Mr. D. M. Rogers, the managing director of the plaintiffs' company. Those representations were that the business in America was wonderful and justified the building of a factory there. The defendant alleged that the company had made losses in America, and that no factory had been built there.

Mr. Forbes, in his evidence, stated that Mr. Rogers described the American market for "Milton" as wonderful, and said he had a site upon which the factory out there was to be built, so that the 25 per cent. importation duty might be saved. It was upon that representation that £100,000 was to be spent in advertising in England and building an American factory that he bought the shares. In cross-examination, Mr. Forbes agreed that the directors of the company took up 27,000 shares out of the 100,000 and that the people who underwrote most of the 73,000 had paid up. "Milton" might have been a successful commodity in England, and there was every reason for believing that it might be successful in America. He also agreed that it was necessary that the company should have money with which to advertise and push their goods in America, and that the company had a smart agent in America. It was a fact that delay had occurred through the difficulty of getting the American authorities to accept labels on the bottles while the agents there owed the company a huge sum on contracts.

At this stage the defendant submitted to judgment in the claim and counterclaim, his counsel observing that after hearing the defendant's admission in cross-examination he could not advise him that it would be wise to proceed.

The Lord Chief Justice, entering judgment for the plaintiffs' company on the claim and counterclaim with costs, said that the defendant gave his evidence with candour, but would have had some difficulty in succeeding.

Oil as a Cause of Oxygen Explosions

Continuation of Work by the U.S. Bureau of Mines

THE second of a series of papers presenting the results of an investigation being made by the United States Department of the Interior, through the Bureau of Mines, on oxygen-oil explosions, deals with the spontaneous ignition of metals in oxygen under pressure. The experiments described in the second paper were undertaken to determine (1) the relationship between oxygen pressure and the ignition temperature of the metals most frequently used in high-pressure oxygen apparatus; and (2) the metals most suitable, as regards safety and freedom from combustion, for use in high-pressure oxygen systems. A study was made of the relation between ignition temperature and pressure for iron, copper, and brass, which are the three materials usually employed, and for lead. It was found that, under high oxygen pressures, iron and steel burned very readily and completely, and if once ignited propagate a flame with almost explosive velocity. On the other hand, brass and copper appeared to burn only very slightly. With brass, a slight combustion apparently took place.

It would seem that the use of iron or steel in the construction of manifolds, etc., might be a dangerous practice once the material is raised to its ignition temperature. It seems probable that copper, and perhaps brass, would survive a higher temperature than steel, and, at most, should any condition cause the manifold and piping to reach a temperature sufficiently high to melt the metal, it would merely melt away and release the oxygen, without burning or propagating a flame. The lowering of ignition temperature with increase in oxygen pressure is shown graphically in the paper, and, so far as known, has not previously been demonstrated in any published experiments. The greatest change noted is in iron. At atmospheric pressure, iron in oxygen ignites at approximately 930° C., while at 2,000 pounds per square inch the ignition temperature drops to approximately 600° C.

The results of these experiments are given in Serial 2,521, by J. J. Jakowsky, assistant engineer, and E. W. Butzler, assistant physicist. A general outline of the problem of oxygen-oil explosions being studied has been given in the first report, Serial 2,507, an abstract of which appeared in THE CHEMICAL AGE of September 22, 1923. Copies of either of the reports may be obtained from the Department of the Interior, Bureau of Mines, Washington, D.C.

Lubrication Research Committee

THE work at the National Physical Laboratory for the Lubrication Research Committee has consisted of investigations into: (*a*) the characteristics of boundary lubrication in engineering practice; (*b*) the changes in pressure and temperature of the oil film between a journal and its bearing in the neighbourhood of the seizing point; and (*c*) the lubrication of sliding surfaces by means of "Aquadag" in the presence of super-heated steam. A successful method has been devised by means of which the values of the co-efficient of friction of different surfaces under conditions of boundary lubrication can be determined up to pressures of 2,000 lbs. per square inch. The application of Amonton's Law to friction under these conditions has been fully established. In the experiments on journals at high pressures and temperatures, observations have been carried into the region between the minimum friction and the seizing point, and it is hoped that the critical conditions for seizure which are now obscure will be discovered. Further progress has been made with the theory of boundary lubrication, and two points have been specially investigated. The first of these is the falling friction which occurs after a lubricant has been applied to a surface. It may take from a few minutes to an hour or more before a steady state is reached. The second is the lubricating properties of a mixture of two pure chemical substances.

The Capital Levy

The Case of the Tradesman

By Sir Ernest J. P. Benn, (*Published in "The Times," November 16*).

Among the several threatening clouds upon the political horizon there is none which is likely to burst with more disastrous effects upon trade and industry than the Capital Levy, still a leading plank of the Labour and Socialist platform.

The Labour Party, however mistaken may be its ideas, is actuated by the best of motives, and, apart from some of its wilder elements, has no desire to bring society to ruin. If, therefore, it can be shown, as I believe to be possible, that the Capital Levy would simply land this country into the sort of trouble that is now common in Europe, it is not too much to hope that the Labour Party will expunge the proposal from its programme. If all the talking on the matter is left to doctrinaires and theorists and business men content themselves with a simply negative attitude, the position will become serious, but if, as I have once or twice suggested, the business world will come out into the open and undertake the education of the people in business matters, then suicidal proposals such as the Capital Levy would cease to be practical politics.

I venture to assert on behalf of the business men of the country that if it were the fact that some of our glaring social ills could be removed by means of a Capital Levy, they would not wait for the proposal to be forced upon them by the Labour Party, but would themselves take the initiative in the matter. The opposition to the Capital Levy does not come from a sense of greed or a desire to preserve personal interests, but from a deep conviction, bred of experience and knowledge, of the frightful damage that would be inflicted upon all classes by any such proposal. The Capital Levy must therefore be discussed in principle and in detail, examined from every point of view, and the fullest information must be put before the public. If this is done, then the public can be trusted to come to a wise and just decision.

When thinking of a Capital Levy, the average voter calls to mind some well-known millionaire, pictures fat bank balances, and feels, as we all feel, that after all no particular calamity would fall upon society if the excesses of riches which we see around us were removed from it. The ideal state is that in which the rich are not too rich and the poor are not too poor, and nobody fails to cherish the feeling that there is something to be said against great riches.

But the Capital Levy is not quite so simple as it appears to the average elector, and my present purpose is to examine the proposal from the point of view of the ordinary business man, and endeavour to trace its effect not only upon him and his business, but upon all those others who are associated with or dependent upon him. For that purpose I have secured, and I publish below the balance sheet of an average business man. I have called him William Maker, for it is obvious that I cannot give him his real name. I have omitted the odd pounds and shillings and pence, for there is no virtue in such details. I have very slightly amended the account here and there to make it of general application, and I publish it as a fair sample of the balance sheets of the great mass of middle-class traders, men who in the bulk are responsible for the greater part of the trade of this country.

WILLIAM MAKER.
BALANCE SHEET.

Liabilities.	£	Assets.	£
Trade creditors.....	14,095	Furniture and fittings..	1,000
Mortgage on freehold...	7,000	Stock :	
Bills payable.....	2,000	Finished goods.....	10,000
Liability to bank on customers' bills, discounted as *per contra*	5,000	Materials	2,000
		Plant and machinery..	2,500
		Investments	1,000
Vendor's account, £20,000.		Work in progress	2,000
		Sundry debtors.....	17,500
Paid for business, £10,000 cash, and £1,000 a year.		Customers' bills, discounted as *per contra*	5,000
		Personal property	1,500
Balance at date.....	8,000	Freehold premises	10,000
Interest at 6 per cent.	480	Life insurance, £10,000, surrender value.....	3,000
Balance	20,175	Cash on current account	1,250
	£56,750		£56,750

William Maker is a typical small manufacturer. We will suppose that he is making shirts and ties, some of those sundry items in everyday comfort which mean so little in politics and so much in human well-being. His figures speak for themselves. He does a trade of £100,000 a year, or £2,000 a week. His expenditure may be divided roughly into £500 a week on materials, and £1,500 a week on wages and other outgoings. He does not directly employ £1,500 worth of labour : some of his wages are paid through others from whom he buys material or partly-finished goods. He makes an income of £3,000 a year, which amounts, as will be seen, to 3 per cent. upon his turnover, or 30 per cent. upon his original capital of £10,000. His figures show that he is investing £1,000 a year of this income in his business, gradually paying off his debt to the vendor. With the other £2,000 he lives in a London suburb in a house rated at £150, which he holds upon a seven years' lease. He is the owner of a two-seater motor-car, he has two children at boarding school, and in one way and another is absolutely committed to the expenditure of the £2,000 which he draws every year from his business. He is, in fact, a typical member of the *bourgeoisie*. He is probably actuated by that motive of gain to which the Labour Party objects so strenuously. But these are questions into which it is not necessary, for my present argument, for me to enter. I am merely concerned to state quite briefly the actual facts of the present position so as to discover what would happen in the event of a Capital Levy.

Mr. William Maker, as will be seen from his balance sheet, is worth just over £20,000. That is the figure at which his estate would be valued for death duties, and the Capital Levy as proposed by the Labour Party would require him to pay £3,000* towards the reduction of the National Debt. How is he to do it ? What steps can he take to discharge this liability ? How could the State secure from this wealthy £20,000 man its just due of £3,000 for the public good ? That is the question to which I invite an answer, having regard to all the facts set out in the balance sheet above.

William Maker, like so many of his class, is trading up to the very limit of his credit. His balance sheet shows that he paid £20,000 for the business which he owns, but that having only £10,000 of his own, he was able to secure the business for half cash and half in annual instalments of £1,000, the vendor's risk in this connection being covered by a life insurance policy on Mr. William Maker which is duly entered in his account. Mr. Maker therefore began his present business career on a £20,000 basis, of which only £10,000 was cash, thus succeeding as so many others do, in making his money go as far as possible. It will be noticed that he is taking all the credit that he can and giving all the credit that he must. His cash in hand at the date of his balance sheet was not sufficient to meet his requirements for the following seven days, so that he is not overburdened with loose money. If a liability of £3,000 were added to those which he already has to shoulder, some other of his creditors, the mortgagee of the freehold, or the bank, would undoubtedly demand a reduction in their advances.

He cannot raise the money by selling his furniture and fittings as they are wanted in the business. He is already raising all he can day by day in the sale of stocks. That money belongs, as the balance sheet shows, to his creditors, and unless they are duly paid he will get no more stocks to carry on his business. Plant and machinery is of course not available for this purpose. His investment of £1,000 consists of money which he has advanced to a smaller manufacturer of a special line of goods which is essential to his business. By financing this man he has been able to introduce improvements into his stock lines which are much appreciated by his customers. His only hope of getting back his £1,000 invest-

* The actual figure on an estate of £20,000 given in the Labour Party's schedule would be £2,800. It will be noticed, however, that Mr. Maker takes no account in his balance sheet for the goodwill of his business, which would probably be valued at £10,000, thus making the demand upon him for Capital Levy much more than the £3,000 suggested.

ment is by small annual payments, but he does not really look for that: his investment was made with a view to the general convenience of the business. At all events it cannot be liquidated for the purpose of the Capital Levy.

His biggest asset consists in his book debts and bills, which amount, as will be seen, to £22,500. But it will be noticed that he already collects these as rapidly as is humanly possible. Where a customer wants more credit than Mr. Maker is willing to give, he draws a bill on him, and has done so to the extent of £5,000, the whole of that money being borrowed from the bank on the security of these bills. It is therefore obvious that the Capital Levy cannot be squeezed out of the "Sundry Debtors." His personal property, the next item on the account, is the figure for which his household goods are insured, and it is not suggested even by the Labour Party that he should part with these in order to pay the levy. The freehold premises, it will be noticed, are mortgaged up to the hilt, and no financier would be willing to put up another sixpence on their account. Mr. Maker has been fortunate in securing a mortgage rather above the two-thirds limit which is generally imposed. The life insurance, as previously mentioned, is held by the vendor as security for debt, and cannot therefore be made to produce the Capital Levy. There is, in fact, no way on the figures in which Mr. Maker can produce £3,000 to the order of the tax collector.

This balance sheet may be in the nature of an eye-opener to some of those who are so ready to discuss the finances of the wealthy. Here is a man who is truly worth £20,000, and who yet has not in hand enough cash to meet the requirements of the next seven days, and is living from hand to mouth in a condition of financial stringency. But—and I speak from a very wide experience of the trading class as a whole—Mr. Maker's position is really typical. It is a mistake to suppose that commerce and industry are carried on by big corporations and millionaires. These people get all the limelight, but they represent only a fraction of the total of British commerce.

Mr. William Maker's position is difficult, but perfectly sound. He owes nobody anything in the Socialist sense. There is no "mere money owner striding in front," as Marx would say. As an enterprising man he has made his money go as far as it would, with the result, as shown by his figures, that he is the centre of £100,000 worth of activity per annum, the whole of this huge business resting upon the foundation of an original capital of £10,000. Mr. Maker is merely an ordinary serious, energetic man, who thinks it right to trade and sets about to do as much of it as he can.

If the Capital Levy Comes

If Labour really does rule, and if the Labour Party does what it says it will, Mr. Maker will get a demand for the payment of £3,000. It makes no difference for the purpose of my argument whether the money has to be paid in one sum or in three annual instalments. There is one way, and only one way, in which Mr. Maker can discharge his liability, and I set it out in the fullest detail for the benefit of every student of the subject. If Mr. Maker will himself undertake part of the duties which would normally fall to his executors, he can pay the £3,000, always assuming, and this is a point to which I will return presently, that everybody else is not trying to do the same thing at the same time.

I set out below a revised balance sheet in which I have shown the results if William Maker were to *halve his trade*.

WILLIAM MAKER HALVES HIS TRADE.

BALANCE SHEET.

LIABILITIES.	£	ASSETS.	£
Trade creditors.....	7,047	Furniture and fittings..	1,000
Mortgage on freehold...	7,000	Stock:	
Bills payable.....	1,000	Finished goods	5,000
Liability to bank on customers' bills discounted as *per contra*	2,500	Materials	1,000
		Plant and machinery...	2,500
Vendor's account, £20,000.		Investments	1,000
		Work in progress	1,000
Paid for business, £10,000 cash, and £1,000 a year.		Sundry debtors.....	8,750
		Customers' bills, discounted as *per contra*	2,500
Balance at date	8,000	Personal property	1,500
Interest at 6 per cent.	480	Freehold premises	10,000
Balance	20,175	Life insurance, £10,000, surrender value	3,000
		Cash on current account	8,952
	£46,202		£46,202

I have divided in two all those items on both sides of the account which refer to trading, purchases and sales, and produced the result which would develop if Mr. Maker determined from a given date to do exactly half the trade that he is now doing. The account speaks for itself. Mr. Maker's credit balance or capital value would of course remain at £20,000, the figure upon which he is to be levied. But instead of his wealth being in stock and book debts a much larger proportion of it would be in cash, and he would have the available funds out of which to pay the levy.

This second balance sheet leads to quite a number of interesting reflections. It shows, for instance, that William Maker could relieve himself of his chronic anxiety in the matter of cash by doing a much smaller business. At present every asset he possesses is only a margin, and he would be in a much safer position if he did not strain his credit to the extent that he is now doing. His income would, of course, be less, unless he were able to get larger profits on the smaller business, but he would be running far less risk.

But let there be no misunderstanding as to what this really means. To pay the Capital Levy, William Maker would not be able to reduce his business all at once. He would have to do it by degrees. He could not, for instance, cut his stock in half. What he would do would be to decline to buy for some months, and thus throw all his suppliers out of work. With half the business he would of course require half the staff, and his wages as well as purchases would have to be reduced considerably. He would, during the transitional period, be a seller and not a buyer, and could not in fact afford to buy from anybody. Sooner or later he would have to move into smaller premises, and must therefore sell his freehold or find a tenant for half of it, in either case weakening the property market and throwing builders out of work. He would of course have to reduce his personal expenditure, and that would mean moving into a smaller house and selling off his motor car; and these are the smallest results of his endeavour to raise the amount of the Capital Levy.

I assume, and this is of course the fatal weakness of the whole argument, that William Maker is the only man in a similar position trying to raise the amount of his Capital Levy. In fact, of course, everybody else would be doing the same thing at the same time, and it is certain that William Maker would be unable to make the sales necessary to reduce his stock, because other people would be declining, just as he is declining, to buy. The result of his action, coupled with similar action by others like him, would be to cause a severe panic in his market, and employment and values and everything else upon which the general security depends would vanish and collapse.

If the Labour Party cares to argue that William Maker is no good to society, and that we should be better without this class of person, then the Capital Levy is the best way to enforce that argument, but it is important that the voter should know exactly what is meant by a Capital Levy and should not be allowed to go to the poll under the impression that the National Debt could be reduced this way, or that anything but disaster can come from the proposal.

The credit system is developed in this country to an extent unknown elsewhere, and the results of tampering with it would be proportionately greater than those which we have seen on the Continent. The Capital Levy, or even the serious threat of it in Great Britain, would cause a collapse with resultant suffering and disaster unparalleled even in the gloomy records of the last few years.

Sir Ernest Benn and East Surrey

THERE is no foundation for the announcement that Sir Ernest Benn is to stand in the Liberal interest for East Surrey. Sir Ernest has had several invitations to contest seats but, in view of his many business responsibilities, is unable to see his way to take part in the present election.

German Chemical Trade

ACCORDING to the official report recently issued by Mr. J. W. F. Thelwall, the Commercial Secretary at Berlin to the Department of Overseas Trade, the business position in the chemical industry during October was such that more workers had to be dismissed, and it is presumed a further restriction of operations is to be reckoned with in the Wiesbaden district.

From Week to Week

PLANS HAVE BEEN passed by Halesowen Rural Council for the extension of a vinegar factory in that locality and a new oil and varnish factory.

THE COUNCIL of Leeds University has conferred the title of Emeritus Professor on Dr. Arthur Smithells, who recently retired from the chair of Chemistry.

MR. H. C. BLYTH has joined the board of the National Mining Corporation, Ltd., to fill the vacancy caused by the retirement of Mr. A. S. Elmore, owing to ill-health.

A DEPOSIT of fuller's earth is reported to have been discovered at Corwen, North Wales. The deposit was discovered in the course of quarrying for slate, and it is estimated that an output of from 60 to 70 tons per week may be attained.

NOTICE IS GIVEN that applications for the Government grant for scientific investigations for the year 1924 must be sent to the offices of the Royal Society, Burlington House, W.1 (upon forms obtainable from the Clerk to the Government Grant Committee), by, at latest, January 1 next.

AT THE BARCELONA Trade Exhibition the Gran Medalla de Ora (a gold medal) was awarded to Mr. R. M. Nosworthy of Calle Valencia, Barcelona, owing to the good quality of the P-V Brand Leather Cloth, for which Mr. Nosworthy has the sole sale for Spain on behalf of the British Pluviusin Co., Ltd., of Manchester, a Nobel Industries concern.

AT THE anniversary dinner of the Institute of Chemistry, to be held at the Hotel Victoria, London, on December 10, the guests will include Viscount Milner, Viscount Haldane, Viscount Burnham, Sir Philip Lloyd-Greame, Lord Justice Sargant, Sir John F. L. Brunner, Sir Edward Brotherton, Sir Amherst Selby-Bigge, Air-Chief-Marshal Sir Hugh Trenchard, Admiral Sir F. C. Doveton Sturdee, Dean Inge, and others.

A REMARKABLE RESPONSE was made on Tuesday by leading Cardiff commercial men to an appeal for funds for the erection of the new science wings of the University College of South Wales and Monmouthshire in Cathays Park, Cardiff. At a luncheon given by Lord Plymouth the scheme was explained, and it was stated that £250,000 was required, of which £100,000 was in hand. After the luncheon nine donors came forward with offers amounting to nearly £57,000.

AT THE annual dinner of the Institution of Rubber Industry, presided over by Mr. Alexander Johnston, Mr. D. F. L. Zorn, chairman of the Council, again advocated the establishment of a Rubber Parliament, at which the problems affecting the industry could be freely discussed, and Mr. Eric Miller expressed the opinion that under fair conditions of competition there was nothing to beat the British manufacturer. The toast of "The Guests," was responded to by Mr. R. B. Pilcher, Registrar of the Institute of Chemistry.

DR. H. E. WATT presided over a meeting of the Edinburgh and East of Scotland section of the Society of Chemical Industry on Tuesday, November 13. The following papers were read:—"The Constitution of Kojic 'Acid,' a y-Pyrone Derivative formed by *Aspergillus Oryzae* from Sugar," by Dr. T. Yabuta; "The Reduction of the Mono-halogenated Phenols," by Mr. J. B. Shoesmith, M.Sc., and Mr. R. H. Slater, B.Sc.; "Polarity Effects in the Isomeric w-Bromotoluie Acids," by Mr. J. B. Shoesmith and Mr. A. C. Hetherington, B.Sc.

MR. WILBUR MILLER, president of the Davison Chemical Co., of Baltimore, U.S.A., left England by the *Aquitania* to-day (Saturday) on his return to the United States. Mr. Miller's visit, which was the 41st he has made to this country, was largely concerned with the Silica Gel Corporation business, and with the proposal to establish an English branch of the company. He left full of confidence that the latter project would be successfully carried through, and expressed his sense of the kindness he had received among British chemical manufacturers.

PROFESSOR G. G. HENDERSON presided over a meeting of the Glasgow section of the Institute of Chemistry on Friday, November 16. The meeting was devoted to an informal discussion of the points raised at the recent Liverpool conference. The formation of a federal council of men of science was discussed at length, and the prevailing feeling was that the first step in this direction should be the formation of a federation of chemists. The following new associates were formally admitted:—John S. Boyd, B.Sc.; Jas. S. Merrylees, B.Sc.; and William A. S. Thom.

MR. H. F. MARRIOTT, a past president of the Institution of Mining and Metallurgy, who was a representative on the Pan-Pacific Science Congress at Melbourne, is making an Empire tour with a view to the formation of a special Empire council, by which it is hoped to federate all mining and metallurgical institutions throughout the Empire. Mr. Marriott is also on a mission from the Imperial College of Science and Technology, London, to discuss with the various University governing bodies throughout the Dominions the proposed establishment of Dominion research fellowships, covering all branches of applied science and mechanical and electrical engineering.

IN CONNECTION with the British Empire Exhibition at Wembley next year, a series of conferences is to be arranged by various associations representing the chief British industries. Already the Association of British Chemical Manufacturers have arranged to hold their conference on July 10. The Textile Institute conference is fixed for June 10 to 12, the Institute of Mining and Metallurgy conference for June 3 to 6, and the Society of Dyers and Colourists for June 11 and 12. Arrangements have also been made between the British Science Guild and the National Joint Council of the Trade Union Congress and the Labour Party to hold a three days' conference on "Science and Labour," beginning on July 31.

AN INTERESTING CASE relating to the will of a technical chemist, Mr. Robert A. Inglis, was decided last week in the Scottish Law Courts. Mr. Inglis left the income for life of his estate of £7,000 to his housekeeper during her life, and directed that after her death his trustees should realise the whole estate and pay the proceeds over to certain charitable and benevolent institutions to which he had contributed during his life, and which he undertook to enumerate in a codicil or codicils. Mr. Inglis died suddenly, and after his death no codicil of his will could be found or any other indication of the institutions which he intended to benefit. In these circumstances the court held that there was no bequest to which effect could be given, and that the capital of the estate fell into intestacy.

THE CHEMICAL SOCIETY announces that a meeting of the Research Fund Committee will be held in December, and that applications for grants, to be made on forms which can be obtained from the Assistant Secretary, Chemical Society, Burlington House, W.1, must be received on or before Saturday December 1, 1923. All persons who received grants in December, 1922, or in December of any previous year, whose accounts have not been declared closed by the Council, are reminded that reports must be returned by December 1. Attention is drawn to the fact that the income arising from the donation of the Worshipful Company of Goldsmiths is to be more or less especially devoted to the encouragement of research in Inorganic and Metallurgical Chemistry, and that the income from the Perkin Memorial Fund is to be applied to investigations relating to problems connected with the coal tar and allied industries.

MR. W. KENYON, chief chemist to H. Steiner and Co., Ltd., dealt with the manufacture and properties of artificial silk and mercerised cotton in an address before the Burnley Textile Society on Friday, November 16. Mr. Kenyon stated that the demand for fancy textile fabrics had been gradually increasing for some time, particularly as regards fancy cotton goods and fancy goods composed of artificial silks interwoven with other textile fabrics. The demand no doubt had been very much inspired by the desire for useful novelties on the part of producers. Quality and fineness of yarn were absolutely necessary in order to produce the higher grade samples, and a very important feature about the manufacture of these articles was that they were the outcome of the application of the most common agent, and they were responsible to a very large extent for the increased variety and adaptability of cotton and mixed fabric goods, for which there was practically no limit to the demand.

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CATALYSIS.—The catalysis of hydrogen peroxide with colloidal ferric salts. J. Duclaux. *J. Chim. Phys.*, March, 1923, pp. 18–29.

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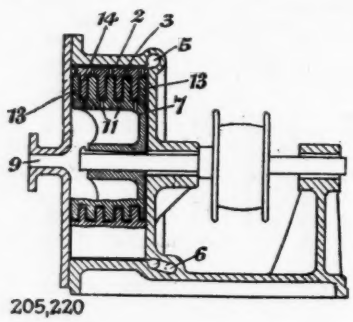
Electrometric estimation of vanadium and uranium alone, together and in the presence of iron. E. Müller and A. Flath. *Z. Elektrochem.*, October, 1923, pp. 500-508.

Patent Literature

Abstracts of Complete Specifications

205,220. DISINTEGRATORS ADAPTED TO PRODUCE COLLOIDAL DISPERSIONS AND PROCESSES OF PRODUCING SUCH DISPERSIONS. J. W. Hinchley, 55, Redcliffe Road, London, S.W., and Plauson's (Parent Co.), Ltd., 17, Waterloo Place, London, S.W.1. Application date, April 13, 1922.

Solids or liquids are dispersed to a colloidal state by a shearing action between members moving with a relative velocity of 6,000–12,000 ft. per minute. These members are not in actual contact, and the material is caused to flow



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between apertures in one or both of them, so that the shearing takes place at the edges of the apertures. The casing is provided with a cylindrical lining 2 having a large number of apertures 3 leading to channels in the lining which communicate with an annular channel 5 leading to the exit 6. The inner rotating drum 7 is provided with collars 13 meshing with corresponding collars 14 projecting from the lining. The material, which may be a solid in a liquid dispersion medium, is supplied through an opening 9, and passes through orifices 11 to the space between the moving members which, may be 1-32nd to $\frac{1}{8}$th of an inch.

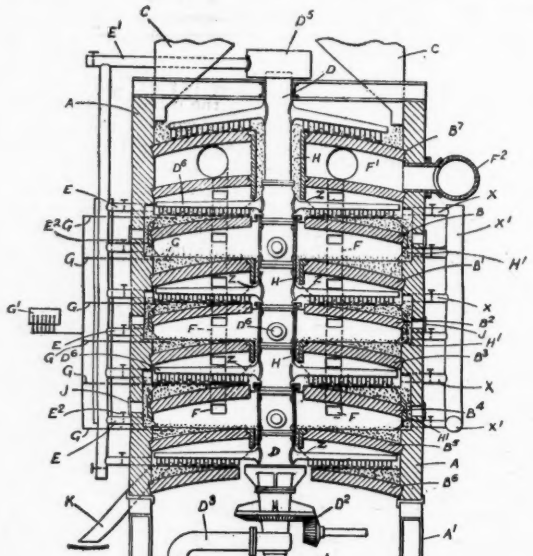
205,525. CONDENSATION PRODUCTS OF THE ANTHRAQUINONE SERIES. A. G. Bloxam, London. From Soc. of Chemical Industry in Basle, Switzerland. Application date May 13, 1922.

An amidated compound of the anthraquinone series, the amino group of which may be mono-substituted, is treated with a 1 : 3 : 5-triazine derivative, which is halogenated in the nucleus—*e.g.*, cyanuric chloride. Condensation products are thus obtained containing 1:3:5-triazine nuclei, and are useful as dyestuffs or as starting materials for obtaining dyestuffs. The condensation may be effected by dissolving or suspending the compounds in a suitable agent such as nitrobenzene, chlorobenzene, naphthalene, toluene, or glacial acetic acid. Cuprous chloride may be added as a condensation agent, or a substance which binds halogen acid may be added. Alternatively, the condensation may be effected by fusion of the compounds. If the 1:3:5:-triazine derivative contains more than one halogen atom, one or more of these may be involved in the reaction, and different anthraquinone derivatives may be coupled with it, such as triazine derivative. Halogen atoms which may be present in the triazine nuclei of a condensation product may be saponified, or may react with ammonia, primary or secondary amines, or compounds of the aliphatic series or the benzene, naphthalene, or anthraquinone series, or other series containing OH or SH groups. Examples are given of the production of condensation products from 1-amido-anthraquinone and cyanuric chloride ; 2-amido-anthraquinone and cyanuric chloride ; 1-amido-4-methoxy-anthraquinone and cyanuric chloride ; 1-amino-anthraquinone and 2-β-naphthylamino-4:6-dichloro-1:3:5-triazine ; 1-amino-anthraquinone and 2:4-diphenyl-6-chloro-1:3:5-triazine ; 1:4- or 1:5-diamido-anthraquinone and cyanuric chloride ; and also compounds of some of these products with substances such as aniline, β-thionaphthol, etc. Other anthraquinone derivatives may also be employed, such as 1-amino-4-chloro-anthraquinone, 1-amino-4-oxy-anthraquinone, 1-amino-2-methyl-4-toluido-anthraquinone, 1-amino-4:5:8-trioxy-anthraquinone, 1:8-diamino-anthraquinone, 1:5-diamino-4:8-dioxy-anthraquinone, 4-amino-1:1′-dianthrimide ; also derivatives such as acetyl- or benzoylamino-anthraquinones, methylamino-anthraquinone, etc. These compounds are usually yellow to red or brown in colour.

205,528. ROASTING METALLIC ORES, METHOD OF AND MEANS FOR. H. S. Mackay, 4, Broad Street Place, London. Application date, May 19, 1922.

In a multiple hearth furnace of the kind in which the ore is swept from hearth to hearth by mechanically-rotated arms, means are provided for isolating each hearth from the others, heating it independently, supplying air to it independently, and controlling the time during which the ore remains on each hearth. It is thus possible to control separately the temperature on the various hearths to prevent overheating of particles of the ore in falling through hot gases or flame, in falling from one hearth to the next, and to prevent the formation of dust.

The illustration shows a series of superposed hearths B, B^1—B^6, with a drying hearth B^7 above these. A central shaft D is rotated by gearing D^2, and is made hollow so that it may be connected to a blower D^4 at the bottom and to a chamber D^5 at the top. The latter is connected by a pipe E^1 to the air inlets E, which are controlled by separate valves E^2 on each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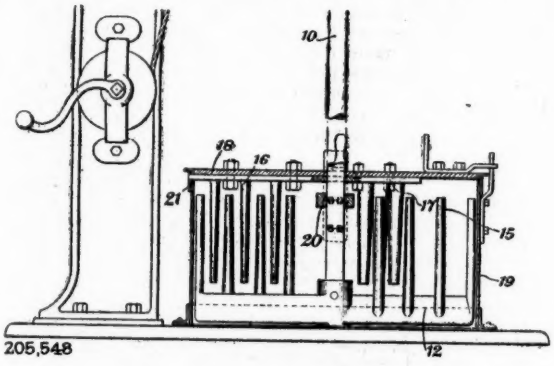
hearth. The shaft D also carries rabble arms D^6, provided with air passages to keep them cool. Each hearth is provided with separate burners X, which may be individually controlled. Each hearth is provided with a flue F controlled by dampers leading to a common exhaust chamber, F^1. Central annular ore shoots H and circumferential shoots H^1 are provided for each hearth. The shoots H terminate just above the rabble arms D^6, which ensures that these shoots remain full of ore, and thus seals each hearth, from the adjacent hearths. The ore passes through the shoots H, H^1 alternately, and descends gradually without shock or formation of dust and without overheating by the hot gases. The ore is fed through the hoppers C to the drying hearth B^7, and passes downwards over the series of hearths to the outlet K.

This furnace is particularly suitable for roasting copper ore containing iron, to render the copper compound soluble and iron and other compounds insoluble. The first three hearths are heated to about 420° C., 450° C. and 490° C. respectively, to convert the copper mainly into sulphate and oxide, but only a small proportion of iron to sulphate. The fourth, fifth

and sixth hearths are heated to about 550° C., 590° C. and 590° C. respectively, to convert the iron sulphate and other iron compounds to insoluble ferric oxide without affecting the copper sulphate. The hearth B^6 is not heated, and the ore is cooled therein by excess of air before discharge.

205,548. Mixing, Emulsifying and Like Machines. C. J. Seaman and Brinjes and Goodwin, Ltd., 36, Coldharbour, London, E. Application date, July 14, 1922.

This apparatus is of the kind in which the mixing is effected by the action of two parts, one being rotatable and having upwardly extending knives, and the other stationary with downwardly extending knives. The object is to enable the rotatable part and the stationary part to be readily removed from the mixing vessel and replaced in the same position.



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The vertical shaft 10 is driven by bevel gearing, and carries arms 12, which are wedge-shaped in the direction of motion, and from which knives 15 project upwards. The shaft 10 passes loosely through the spider frame 17 carried by a cover 18 on the mixing vessel 19. The frame 17 carries knives 16, which project downwards between the rotating knives 15. The frame 17 is held stationary by its engagement with recesses 21 in the vessel 19. The shaft 10 carries a collar 20, so that on raising it the frame 17 is also lifted together with both sets of knives for cleaning purposes.

205,563. Aluminium Chloride and Alumina, Process for Production of. A. L. Mond, London. From Chemische Fabrik Griesheim-Elektron, 51, Gutleutstrasse, Frankfurt-on-Main, Germany. Application date, July 18, 1922.

The object is to obtain pure alumina from clay and other aluminiferous materials. The solution of aluminium chloride obtained by treating clay with hydrochloric acid may be treated with anhydrous hydrochloric acid gas of high percentage to precipitate the aluminium chloride, but the anhydrous hydrochloric acid gas is expensive to produce, and in the present process its use is avoided. Calcined clay is treated with hydrochloric acid, and the solution filtered and evaporated to obtain a crystal sludge which contains most of the aluminium chloride, the iron chloride remaining in solution. The sludge is filtered by suction, and washed with the remainder of solution, which is enriched with hydrochloric acid and water obtained by heating pure aluminium chloride from a previous operation. The greater part of the iron chloride may thus be removed from the aluminium chloride. The latter is then washed with hydrochloric acid free from iron, which is also obtained from the gases resulting from the heating of aluminium chloride. This acid may subsequently be removed either for adding to the acid used for treating clay, or for the first washing operation. When iron chloride accumulates in this solution, it may be used to obtain hydrochloric acid by heating. Pure aluminium chloride is thus obtained, and may be used for obtaining pure alumina. It is found that the separation of the alumina from iron may be obtained with a 20 per cent. hydrochloric acid solution in which aluminium chloride is sparingly soluble. Such acid is effective for washing the crystals even if saturated with aluminium chloride. The enriching of the solution used for treating clay by adding hydrochloric acid yields a more concentrated solution of aluminium chloride, so that the process effects an economy in evaporating costs.

205,599. Cleansing Compositions, Manufacture and Production of. H. D. Golding, and The United Alkali Co. Ltd., Cunard Building, Liverpool. Application date, July 28, 1922.

The object is to produce a cleansing composition in the form of paste, which may be used without employing water. The composition consists of paraffin oil 12 gallons, soap 30 lb., and water 32 gallons. The mixture is converted into an emulsion by agitation.

Note.—Abstracts of the following specifications which are now accepted appeared in The Chemical Age when they became open to inspection under the International Convention: 191,008 (E. Layraud), relating to unsymmetrical C. C-dialkylbarbituric acid, see Vol. VIII, p. 215; 191,363 (H. Pereira), relating to a process for manufacturing dioxyperylene, see Vol. VIII, p. 269; 193,843 (Durand et Huguenin Soc. Anon.), relating to manufacture of highly chlorinated hydro-aromatic products containing nitrogen, see Vol. VIII, p. 494; 194,719 (Consortium fur Elektrochemische Industrie Ges.), relating to manufacture of anhydrides of fatty acids of low molecular weight, see Vol. VIII, p. 576; 199,360 (Soc. of Chemical Industry in Basle), relating to manufacture of new dyestuffs of indigo tint, see Vol. IX, p. 211.

International Specifications not yet Accepted

203,708. Aluminium-Alkali Fluorides. Chemische Fabrik Griesheim Elektron, 51, Gutleutstrasse, Frankfort-on-Main, Germany. International Convention date, September 8, 1922.

A solution obtained by treating clay with mineral acid is treated with hydrofluoric acid and an alkali salt, or a fluoride and a mineral acid such as hydrochloric or sulphuric acid to precipitate aluminium alkali fluoride. The precipitation of iron at the same time is avoided by leaving a small amount of unprecipitated aluminium salt in the solution, or by previously treating it with sulphuretted hydrogen to reduce the iron to the ferrous condition. Examples are given of the precipitation of the aluminium salt by the addition of hydrofluoric acid and sodium chloride or sodium sulphate; and hydrochloric acid and potassium or sodium fluoride. The precipitate is separated and the remaining acid liquor used for treating more clay.

203,713–4. Filtering Liquids. J. Duclaux, 34, Rue du Bac, Paris. International Convention date, September 11, 1922.

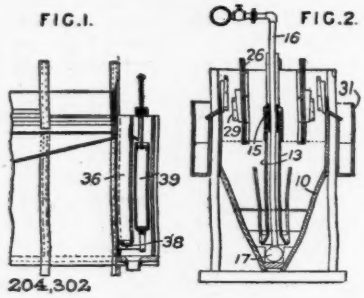
203,713. Porous filtering membranes are made by allowing a film of cellulose acetate solution to dry incompletely or by coagulating the film by a non-solvent medium. Cellulose acetate may be dissolved in acetic acid, and the film coagulated with water to produce such a filtering medium. These membranes are suitable for the dialysis or ultra-filtration of solutions in water, alcohols, or other solvents which are miscible or immiscible with water. Solutions of fatty bodies and resins may be filtered in this way. If a benzene solution is to be filtered, the water in the membrane is first removed by washing with alcohol or acetone, which are miscible both with water and benzene.

203,714. The manufacture of filtering membranes by the above process is described. A strip of cloth which forms a support for the membrane is passed first through a solution of cellulose ester and then through a coagulating liquid, after the cellulose film has solidified. The solvent vapour from the cellulose ester may be recovered.

204,302. Concentrating Ores. A. B. Emery, Messina, Transvaal, South Africa. International Convention date, September 21, 1922.

A number of communicating compartments such as 10 are arranged side by side, and ore pulp is fed to the first compartment of the series. The pulp is circulated by means of air or gas admitted through the pipe 16 to a perforated tube 17 having a covering of sacking or wire cloth. The air is discharged below the end of a narrow rectangular conduit 13 having perforations 15 at its upper end, which is above the normal level of the pulp. The jets of pulp impinge against baffles 26, and the resulting froth passes under the lower edges of the baffles to passages 29 and thence to the launder at the side. The pulp thus passes through the series of

compartments, and the tailings are finally discharged into a vessel 36 having a discharge valve 38 which is controlled by the weight of the liquid overflowing into a vessel 39 suspended by a spring.



204,322. Wood Pulp Soda Residues, Recovering Products from. Vereinigte Glanzstoff-Fabriken Akt.-Ges., Elberfeld, Germany. International Convention date, September 20, 1922.

A heavy metal compound such as copper sulphate is added to soda liquor in which wood pulp has been treated, and the precipitate is heated in an autoclave for three hours at three atmospheres pressure. Cuprous oxide or metallic copper is obtained.

204,337. Boron Carbides. Hartstoff-Metall Akt.-Ges., Brandenburghplatz, Kaiser-Wilhelmstrasse, Copenick, Berlin (Assignees of E. Podszus, 33, Schöneicher-Chaussée, Friedrichshagen, Berlin). International Convention date, September 20, 1922.

Boron carbides are obtained by fusing a mixture of boron, boron carbide (B_6C) or boron nitride, and carbon. The carbides thus obtained have a higher proportion of carbon, such as B_3C. The solution of the carbon is facilitated if the process is conducted under pressure, and the product is rapidly cooled to avoid the separation of graphite. The heating may be effected by passing an electric current through the mixture, or a mass of boron or boron carbide may be melted in coal smoke until the necessary carbon is absorbed. Metals having a high melting point may also be added.

Latest Notifications.

206,809. Treatment of titaniferous material. Titanium Pigment Co. Inc., November 8, 1922.

206,822. Process of manufacture of hydrogen. L'Oxhydrique Française. November 7, 1922.

206,831. Manufacture of azo dyestuffs. Farbwerke vorm. Meister Lucius and Bruning. November 10, 1922.

206,848. Process for the production of *p*.-Cymene from monocyclic terpenes. Austerweil, G., and Peufaillit, L.

206,862. Process of producing or reactivating decolorizing carbon. Naamlooze Vennootschap Algemeene Norit Maatschappij. May 26, 1922.

Specifications Accepted, with Date of Application

186,589. Zinc from zinciferous materials, Process and apparatus for the extraction of. F. Hansgirg. September 30, 1921.

194,666. Artificial silk, Manufacture of. Farbenfabriken vorm. F. Bayer and Co. March 1, 1922.

204,047. Centrifugal separators. Aktiebolaget Separator. September 13, 1922.

206,174. Apparatus for effecting intimate contact of gases and liquids. S. Wright and Meldrums, Ltd. April 29, 1922.

206,178. Destructive distillation of coal and similar carbonaceous substances. T. M. Davidson. May 1, 1922.

206,187. Conveyers. Spencer (Melksham), Ltd., and A. P. Lambert. June 1, 1922.

206,207. Sulphide ores and minerals, Treatment of. E. F. Peterson and S. Field. July 27, 1922.

206,228. Grinding and pulverising mills. H. W. Portas. August 1, 1922.

206,229. Acid fumes evolved during the concentration of sulphuric acid, Process for condensing. Chance and Hunt, Ltd., W. A. S. Calder, and W. H. Palmer. August 1, 1922.

206,245. Charcoal, Process of and apparatus for the production of. S. Hillier. August 3, 1922.

206,267. Base-exchanging compounds, Manufacture and production of. T. P. Hilditch, H. J. Wheaton, and J. Crosfield and Sons, Ltd. August 14, 1922.

206,268. Porous or absorbent material, Manufacture and production of. T. P. Hilditch, H. J. Wheaton and J. Crosfield and Sons, Ltd. August 14, 1922.

206,284. Titanium complexes and method for producing same. W. P. Carpmael (*H. H. Buckman*). August 29, 1922.

206,363. Nitrogen-assimilating manure, Method of manufacturing. P. Jorgensen. November 8, 1922.

206,372. Sodium compound, Process for the production of. H. E. Cocksedge. November 15, 1922.

206,444. Filters. P. Dehne. January 11, 1923.

Applications for Patents

Bettisfield Trust Co., Ltd., and Perkin, F. M. Treatment of peat. 28758. November 14.

Bhopal Produce Trust, Ltd., Fraymouth, W. A., and Wade, H. Recovery of calcium oxalate from vegetable material. 28766. November 14.

Bloxam, A. G. and Chemische Fabrik Griesheim-Elektron. Manufacture of acylacetyl compounds. 28997. November 16.

Carrera, L. A. Electrolytic tanks. 29097. November 17. (Spain, November 18, 1922.)

Chase, D. E. Dehydration of oils. 28866. November 15.

Cross, C. F., and Engelstad, A. Manufacture of wood-pulp and by-products. 28864. November 15.

Farbenfabriken vorm. F. Bayer and Co. Process for obtaining sulphur from a gas containing hydrogen sulphide. 29008. November 16. (Germany, November 20, 1922.)

General Norit Co., Ltd., and Naamlooze Vennootschap Algemeene Norit Maatschappij. Process of producing or reactivating decolorizing carbon. 28620. November 13. (Germany, May 26, 1922.)

Hamilton, J. M. Manufacture of candles. 28703. November 14.

Heyl, G. E. Distillation of oil shale, etc. 29064. November 17.

Lucas, O. D., and V. L. Oil Processes, Ltd. Methods of refining hydrocarbons. 28699. November 14.

Minerals Separation, Ltd. Valves for pulpy material, etc. 28745. November 14.

Soc. Chimique de la Grande Paroisse (Azote et Produits Chimiques). Manufacture of fertilizers. 28464. November 12. (France, January 24.)

Patents Court Cases

Applications have been made under Section 24 of the Patents and Designs Acts, 1907 and 1919, for the following patents to be indorsed "Licences of Right":—14230/1913 (F. Raschig) relating to a process and apparatus for continuous distillation; 6288/1914 (F. Raschig) relating to filling materials for reaction or absorption towers. Any notice of opposition must be given by December 14, 1923.

The Use of White Lead in Industry

The Draft Convention of the third International Labour Conference of the League of Nations, which is to be laid before Parliament at an early date, is to be strongly opposed by some influential industrial interests. The effect of the Convention is to prohibit the use of white lead in interior painting, with certain exceptions which may be extended by the Government to cover industrial establishments. The purpose of the prohibition is to prevent lead poisoning, which, it is generally agreed, is due to the dust created by rubbing down painted surfaces with dry sandpaper. The Federation of British Industries, which has investigated the question for itself, disputes the conclusions of the Labour Conference, and has made representations to the Government. It claims that about 40 per cent. (instead of 10 per cent. estimated by the Conference) of the total consumption of white lead is used for interior painting, and that if this were stopped, the reduced production would raise the prices to an extent that would make it impossible for British manufacturers to compete in foreign markets. The federation also maintains that there is no efficient substitute for white lead paint, and quotes the Committee on Industrial Paints to this end, and that there is a recently introduced damp method of rubbing down paint (which was not brought to the notice of the Conference) by means of waterproof sandpaper, avoiding dust and minimising the danger of lead poisoning. The conclusions of the federation are that the Home Office, in collaboration with and with the approval of the trades concerned, has already drafted regulations covering the necessary ground, and that legislation giving effect to any other of the proposals of the Geneva Conference is unnecessary and undesirable in the interests of industry and of the general public.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.

London, November 22, 1923.

THE past week has witnessed great activity in most branches of the chemical trade, particularly in respect to all chemicals which are imported from abroad. The reported statement of the German Government that they are unable to encash Reparation Receipts in respect to goods purchased after a certain date has materially affected the markets here, as it seems to portend a substantial advance in the price of many lines.

There has been a rush to secure supplies available, and markets are rising. Export business is without special feature.

General Chemicals

ACETONE is in good demand. A satisfactory business is reported at recent prices.

ACID ACETIC.—A good volume of business has passed, and the price is firm.

ACID CITRIC is dearer in price, and makers are looking for still higher prices.

ACID CARBOLIC is weaker in price, and with little demand.

ACID LACTIC.—Unchanged. Price seems likely to advance further, due to the German situation.

ACID TARTARIC is firmer; makers are expecting higher prices.

FORMALDEHYDE is much firmer and in good demand.

LEAD ACETATE still inclines upwards, and business passing is fair.

LIME ACETATE is firm, and scarce for early delivery.

LITHOPONE.—Unchanged.

POTASSIUM CARBONATE AND CAUSTIC.—Unchanged, but likely to be affected by the Continental situation.

METHYL ALCOHOL has advanced in price.

POTASSIUM PERMANGANATE has advanced in price.

POTASSIUM PRUSSIATE is in good demand at recent figures.

SODA ACETATE is firmer, but demand is still small.

SODA HYPOSULPHITE.—Unchanged.

SODA PRUSSIATE.—The advance in price is maintained, and there is little more enquiry.

Pharmaceutical Chemicals

ACETYL SALICYLIC ACID continues in steady demand, advanced prices being readily paid for the best brands.

ACETANILID.—Higher prices are quoted in most directions. Stocks are low and firmly held.

ACID LACTIC is unchanged, with the market firm and tending to go higher.

BARBITONE has been in small demand. Price, after falling recently, is moving upward again.

BROMIDES.—Continental prices are dearer. A fair business is reported, with holders in no hurry to sell freely in view of the generally firm market and prospect of higher values likely to rule in the near future. The position arising from the German Government declining to refund the against Reparation receipts on orders not already booked should influence the market considerably.

CALCIUM LACTATE is slightly firmer. Supplies are limited.

COCAINE.—The Continental position, based upon a strong market for Coca leaves, is firm.

GUAIACOL CARBONATE is scarce on the spot, higher prices being asked by holders in some directions.

HEXAMINE continues in demand, price slightly higher.

HYDROQUINONE is fairly firm and expected to move upwards.

PARALDEHYDE is advancing.

PHENACETIN is higher.

PHENOLPHTHALEIN continues its upward course.

SODA SALICYLATE.—Considerable business is again reported, the advanced price being freely paid.

SODA BENZOATE has moved to a higher level.

SULPHONAL is steadier, although ideas of price vary considerably. Stocks seem limited and any fresh demand would probably result in values being raised again.

Coal Tar Intermediates

There is little change to report in the situation of this market. Supplies in most cases are fairly satisfactory and inquiry is quite good.

ALPHA NAPHTHOL is unchanged in price, and export buyers are interested.

ALPHA NAPHTHYLAMINE is steady.

ANILINE OIL AND SALT continue in good demand, with steady inquiry on export account.

BETA NAPHTHOL is unchanged in price, and has been in good demand.

BETA NAPHTHYLAMINE is featureless.

DIMETHYLANILINE is steady.

DIPHENYLAMINE is very firm.

"G" SALT.—A few inquiries have been received.

"H" ACID continues to pass regularly into consumption, at last quoted price.

METAPHENYLENEDIAMINE.—Some export inquiry is in the market.

PARANITRANILINE is unchanged.

RESORCINE TECHNICAL continues on the short side.

Coal Tar Products

There is little variation in values generally since last week.

90 % BENZOL is plentiful and is worth 1s. 3d. per gallon on rails.

PURE BENZOL has a poor market and the price is unchanged.

CREOSOTE OIL is steady, at 8¼d. to 8⅜d. per gallon on rails in the North, and 9¼d. per gallon in London.

CRESYLIC ACID is also steady at 1s. 10d. to 2s. per gallon on rails for the Pale quality 97/99 %, while the Dark quality 95/97 % is worth from 1s. 6d. to 1s. 8d.

SOLVENT NAPHTHA is somewhat uninteresting, and is worth about 11d. per gallon on rails in the North.

HEAVY NAPHTHA is also quiet, and is worth about 1s. per gallon.

NAPHTHALENES are in no great demand, to-day's prices being £6 10s. to £7 5s. per ton for the low grade quality, 74/76 being quoted at £7 15s. to £8 5s. per ton, and 76/78 quality from £8 10s. to £9 per ton.

PITCH is dull and very few transactions have been reported during the past week. The demand from abroad has not revived and prices are gradually dropping. To-day's quotations are:—London, 125s. to 130s.; East Coast, 120s. to 125s.

Sulphate of Ammonia

The demand is quiet, but prices are well maintained.

[Current Market Prices on following pages.]

New Managing Director of Lever Brothers, Ltd.

MR. L. H. HARTLAND-SWANN has joined the board of Lever Bros., Ltd., and been appointed a managing director of the company. He is also chairman of International Icilma Trading Co., Ltd., of Vinolia Co., Ltd., and Blondeau et Cie, Ltd. Mr. Hartland-Swann will devote his attention chiefly to the toilet companies associated with Lever Bros., Ltd. During the war Mr. Hartland-Swann was on the staff of the National War Savings Committee, was Director of Advertising in the Coal Mines Department of the Board of Trade, and later was appointed Director of Advertising to the Victory Loan, in which capacity he took charge of the last two campaigns. He has also been deputy-president of the British Association of Advertising, and vice-chairman of the Sales Managers' Association, and was prominently connected with the leading advertising associations and clubs, but now devotes himself entirely to the Lever interests.

Current Market Prices

General Chemicals

	Per	£	s.	d.		£	s.	d.
Acetic anhydride, 90–95%	lb.	0	1	4	to	0	1	5
Acetone oil	ton	80	0	0	to	85	0	0
Acetone, pure	ton	125	0	0	to	126	0	0
Acid, Acetic, glacial, 99–100%	ton	73	0	0	to	74	0	0
Acetic, 80% pure	ton	49	0	0	to	50	0	0
Acetic, 40% pure	ton	24	0	0	to	25	0	0
Arsenic, liquid, 2000 s.g.	ton	85	0	0	to	88	0	0
Boric, commercial	ton	48	0	0	to	52	0	0
Carbolic, cryst. 39–40%	lb.	0	1	0½	to	0	1	1
Citric	lb.	0	1	5	to	0	1	5½
Formic, 80%	ton	52	0	0	to	54	0	0
Hydrofluoric	lb.	0	0	7½	to	0	0	8½
Lactic, 50 vol	ton	39	0	0	to	40	0	0
Lactic, 60 vol	ton	45	0	0	to	47	0	0
Nitric, 80 Tw	ton	24	0	0	to	25	0	0
Oxalic	lb.	0	0	5¾	to	0	0	6
Phosphoric, 1.5	ton	35	0	0	to	38	0	0
Pyrogallic, cryst.	lb.	0	5	9	to	0	6	0
Salicylic, technical	lb.	0	1	9½	to	0	2	0
Sulphuric, 92–93%	ton	6	0	0	to	7	0	0
Tannic, commercial	lb.	0	2	3	to	0	2	9
Tartaric	lb.	0	1	0½	to	0	1	1
Alum, lump	ton	12	10	0	to	13	0	0
Chrome	ton	23	0	0	to	24	0	0
Alumino ferric	ton	7	0	0	to	7	5	0
Aluminium, sulphate, 14–15%	ton	8	10	0	to	9	0	0
Sulphate, 17–18%	ton	10	10	0	to	11	0	0
Ammonia, anhydrous	lb.	0	1	6	to	0	1	8
.880	ton	32	0	0	to	34	0	0
.920	ton	22	0	0	to	24	0	0
Carbonate	ton	30	0	0	to	32	0	0
Chloride	ton	50	0	0	to	55	0	0
Muriate (galvanisers)	ton	32	0	0	to	33	0	0
Nitrate (pure)	ton	35	0	0	to	40	0	0
Phosphate	ton	63	0	0	to	65	0	0
Sulphocyanide, commercial 90%	lb.	0	1	1	to	0	1	3
Amyl acetate, technical	ton	280	0	0	to	300	0	0
Arsenic, white powdered	ton	65	0	0	to	68	0	0
Barium, carbonate, Witherite	ton	5	0	0	to	6	0	0
Carbonate, Precip.	ton	15	0	0	to	16	0	0
Chlorate	ton	65	0	0	to	70	0	0
Chloride	ton	15	0	0	to	15	10	0
Nitrate	ton	33	0	0	to	35	0	0
Sulphate, blanc fixe, dry	ton	20	10	0	to	21	0	0
Sulphate, blanc fixe, pulp	ton	10	5	0	to	10	10	0
Sulphocyanide, 95%	lb.	0	0	11	to	0	1	0
Bleaching powder, 35–37%	ton	10	7	6	to	10	17	6
Borax crystals, commercial	ton	25	0	0	to		—	
Calcium acetate, Brown	ton	13	0	0	to	14	0	0
Grey	ton	22	0	0	to	23	0	0
Carbide	ton	13	0	0	to	13	10	0
Chloride	ton	5	15	0	to	6	0	0
Carbon bisulphide	ton	35	0	0	to	40	0	0
Casein technical	ton	80	0	0	to	90	0	0
Cerium oxalate	lb.	0	3	0	to	0	3	6
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	6	0	to	0	6	6
Oxide, black	lb.	0	9	6	to	0	10	0
Copper chloride	lb.	0	1	1	to	0	1	2
Sulphate	ton	25	0	0	to	25	10	0
Cream Tartar, 98–100%	ton	86	0	0	to	88	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde, 40% vol.	ton	65	0	0	to	66	0	0
Formusol (Rongalite)	lb.	0	1	11	to	0	2	0
Glauber salts, commercial	ton	4	0	0	to	4	10	0
Glycerin crude	ton	65	0	0	to	67	10	0
Hydrogen peroxide, 12 vols.	gal	0	2	0	to	0	2	1
Iron perchloride	ton	18	0	0	to	20	0	0
Sulphate (Copperas)	ton	3	10	0	to	4	0	0
Lead acetate, white	ton	42	0	0	to	44	0	0
Carbonate (White Lead)	ton	50	0	0	to	52	0	0
Nitrate	ton	44	10	0	to	45	0	0
Litharge	ton	37	0	0	to	39	0	0
Lithophone, 30%	ton	22	10	0	to	23	0	0
Magnesium chloride	ton	3	10	0	to	3	15	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	5	15	0	to	6	0	0
Sulphate (Druggists')	ton	8	0	0	to	9	0	0
Manganese Borate, commercial	ton	65	0	0	to	75	0	0
Sulphate	ton	45	0	0	to	50	0	0
Methyl acetone	ton	82	0	0	to	85	0	0
Alcohol, 1% acetone	ton	80	0	0	to	85	0	0
Nickel sulphate, single salt	ton	37	0	0	to	38	0	0
Ammonium sulphate, double salt	ton	37	0	0	to	38	0	0

	Per	£	s.	d.		£	s.	d.
Potash, Caustic	ton	30	0	0	to	32	0	0
Potassium bichromate	lb.	0	0	5¾	to	0	0	6
Carbonate, 90%	ton	30	0	0	to	31	0	0
Chloride, 80%	ton	9	0	0	to	10	0	0
Chlorate	lb.	0	0	3¾	to		—	
Metabisulphite, 50–52%	ton	65	0	0	to	70	0	0
Nitrate, refined	ton	38	0	0	to	40	0	0
Permanganate	lb.	0	0	10	to	0	0	10½
Prussiate, red	lb.	0	2	10	to	0	3	0
Prussiate, yellow	lb.	0	0	10½	to	0	0	11
Sulphate, 90%	ton	10	0	0	to	10	10	0
Salammoniac, firsts	cwt.	2	15	0	to		—	
Seconds	cwt.	2	17	6	to		—	
Sodium acetate	ton	25	0	0	to	25	10	0
Arsenate, 45%	ton	45	0	0	to	48	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	4¾	to	0	0	4¾
Bisulphite, 60–62%	ton	21	0	0	to	23	0	0
Chlorate	lb.	0	0	3	to	0	0	3½
Caustic, 70%	ton	17	10	0	to	18	0	0
Caustic, 76%	ton	18	10	0	to	19	0	0
Hydrosulphite, powder	lb.	0	1	5	to	0	1	6
Hyposulphite, commercial	ton	10	10	0	to	11	0	0
Nitrite, 96–98%	ton	27	10	0	to	28	0	0
Phosphate, crystal	ton	16	0	0	to	16	10	0
Perborate	lb.	0	0	11	to	0	1	0
Prussiate	lb.	0	0	6	to		—	
Sulphide, crystals	ton	8	10	0	to	9	0	0
Sulphide, solid, 60–62 %	ton	14	10	0	to	15	10	0
Sulphite, cryst.	ton	11	10	0	to	12	0	0
Strontium carbonate	ton	50	0	0	to	55	0	0
Nitrate	ton	50	0	0	to	55	0	0
Sulphate, white	ton	6	10	0	to	7	10	0
Sulphur chloride	ton	25	0	0	to	27	10	0
Flowers	ton	11	0	0	to	11	10	0
Roll	ton	9	15	0	to	10	10	0
Tartar emetic	lb.	0	0	11½	to	0	1	0
Tin perchloride, 33%	lb.	0	1	1	to	0	1	2
Perchloride, solid	lb.	0	1	3	to	0	1	4
Protochloride (tin crystals)	lb.	0	1	4	to	0	1	5
Zinc chloride 102° Tw.	ton	20	0	0	to	21	0	0
Chloride, solid, 96–98%	ton	25	0	0	to	30	0	0
Oxide, 99%	ton	42	0	0	to	45	0	0
Dust, 90%	ton	50	0	0	to	55	0	0
Sulphate	ton	15	0	0	to	16	0	0

Pharmaceutical Chemicals

Acetyl salicylic acid	lb.	0	3	9	to	0	4	0
Acetanilid	lb.	0	2	9	to	0	3	0
Acid, Gallic, pure	lb.	0	3	0	to	0	3	3
Lactic, 1.21	lb.	0	2	8	to	0	3	0
Salicylic, B.P.	lb.	0	2	5	to	0	2	7
Tannic, leviss	lb.	0	3	2	to	0	3	4
Amidol	lb.	0	7	6	to	0	8	0
Amidopyrin	lb.	0	13	6	to	0	14	0
Ammon ichthosulphonate	lb	0	1	10	to	0	2	0
Barbitone	lb.	0	17	6	to	0	18	6
Beta naphthol resublimed	lb.	0	2	0	to	0	2	3
Bromide of ammonia	lb.	0	0	10	to	0	1	0
Potash	lb.	0	0	8	to	0	0	9
Soda	lb.	0	0	8½	to	0	0	9½
Caffeine, pure	lb.	0	11	0	to	0	11	6
Calcium glycerophosphate	lb.	0	5	9	to	0	6	0
Lactate	lb.	0	2	0	to	0	2	3
Calomel	lb.	0	3	9	to	0	4	0
Chloral hydrate	lb.	0	4	0	to	0	4	3
Cocaine alkaloid	oz.	0	19	6	to	1	0	0
Hydrochloride	oz.	0	16	9	to	0	17	3
Corrosive sublimate	lb.	0	3	3	to	0	3	6
Eucalyptus oil, B.P. (70–75% eucalyptol)	lb.	0	2	6	to	0	2	8
B.P. (75–80% eucalyptol)	lb.	0	2	7	to	0	2	9
Guaiacol carbonate	lb.	0	12	9	to	0	13	3
Liquid	lb.	0	8	9	to	0	9	3
Pure crystals	lb.	0	9	3	to	0	9	9
Hexamine	lb.	0	4	3	to	0	4	6
Hydroquinone	lb.	0	4	3	to	0	4	6
Lanoline anhydrous	lb.	0	0	7	to	0	0	7½
Lecithin ex ovo	lb.	0	17	6	to	0	19	0
Lithi carbonate	lb.	0	9	6	to	0	10	0
Methyl salicylate	lb.	0	2	10	to	0	3	3
Metol	lb.	0	9	0	to	0	10	0
Milk sugar	cwt.	4	2	6	to	4	10	0
Paraldehyde	lb.	0	1	7	to	0	1	9
Phenacetin	lb.	0	7	6	to	0	8	0
Phenazone	lb.	0	8	3	to	0	8	9
Phenolphthalein	lb.	0	8	0	to	0	8	6
Potassium sulpho guaiacolate	lb.	0	7	0	to	0	7	6
Quinine sulphate, B.P.	oz.	0	2	3	to		—	

	Per	£	s.	d.		£	s.	d.
Resorcin, medicinal	lb.	0	5	9	to	0	6	0
Salicylate of soda powder	lb.	0	3	0	to	0	3	3
Crystals	lb.	0	3	0	to	0	3	3
Salol	lb.	0	4	0	to	0	4	3
Soda Benzoate	lb.	0	3	6	to	0	3	9
Sulphonal	lb.	0	17	6	to	0	18	6
Terpene hydrate	lb.	0	1	9	to	0	2	0
Theobromine, pure	lb.	0	11	0	to	0	11	6
Soda salicylate	lb.	0	8	6	to	0	9	0
Vanillin	lb.	1	3	0	to	1	4	0

Coal Tar Intermediates, &c.

Alphanaphthol, crude	lb.	0	2	0	to	0	2	3
Refined	lb.	0	2	6	to	0	2	9
Alphanaphthylamine	lb.	0	1	6½	to	0	1	7
Aniline oil, drums extra	lb.	0	0	9	to	0	0	9½
Salts	lb.	0	0	9½	to	0	0	10
Anthracene, 40–50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	2	6	to	0	2	9
Benzidine, base	lb.	0	4	9	to	0	5	0
Sulphate	lb.	0	3	9	to	0	4	0
Benzoic acid	lb.	0	2	0	to	0	2	3
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol	lb.	0	1	1	to	0	1	2
Betanaphthylamine, technical	lb.	0	4	0	to	0	4	3
Croceine Acid, 100% basis	lb.	0	3	3	to	0	3	6
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	4	6	to	0	4	9
Dinitrobenzol	lb.	0	1	1	to	0	1	2
Dinitrochlorbenzol	lb.	0	0	11	to	0	1	0
Dinitronaphthalene	lb.	0	1	4	to	0	1	5
Dinitrotoluol	lb.	0	1	4	to	0	1	5
Dinitrophenol	lb.	0	1	6	to	0	1	7
Dimethylaniline	lb.	0	2	9	to	0	3	0
Diphenylamine	lb.	0	3	6	to	0	3	9
H-Acid	lb.	0	4	9	to	0	5	0
Metaphenylenediamine	lb.	0	4	0	to	0	4	3
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	5	9	to	0	6	0
Metatoluylenediamine	lb.	0	4	0	to	0	4	3
Monosulphonic Acid (2.7)	lb.	0	8	6	to	0	9	6
Naphthionic acid, crude	lb.	0	2	6	to	0	2	8
Naphthionate of Soda	lb.	0	2	6	to	0	2	8
Naphthylamine-di-sulphonic-acid	lb.	0	4	0	to	0	4	3
Nevill Winther Acid	lb.	0	7	3	to	0	7	9
Nitrobenzol	lb.	0	0	7	to	0	0	8
Nitronaphthalene	lb.	0	0	11½	to	0	1	0
Nitrotoluol	lb.	0	0	8	to	0	0	9
Orthoamidophenol base	lb.	0	12	0	to	0	12	6
Orthodichlorbenzol	lb.	0	1	0	to	0	1	1
Orthotoluidine	lb.	0	0	10	to	0	0	11
Orthonitrotoluol	lb.	0	0	3	to	0	0	4
Para-amidophenol, base	lb.	0	8	6	to	0	9	0
Hydrochlor	lb.	0	7	6	to	0	8	0
Paradichlorbenzol	lb.	0	0	9	to	0	0	10
Paranitraniline	lb.	0	2	7	to	0	2	9
Paranitrophenol	lb.	0	2	3	to	0	2	6
Paranitrotoluol	lb.	0	2	9	to	0	3	0
Paraphenylenediamine, distilled	lb.	0	12	0	to	0	12	6
Paratoluidine	lb.	0	5	6	to	0	5	9
Phthalic anhydride	lb.	0	2	6	to	0	2	9
Resorcin technical	lb.	0	4	0	to	0	4	3
Sulphanilic acid, crude	lb.	0	0	10	to	0	0	11
Tolidine, base	lb.	0	7	3	to	0	7	9
Mixture	lb.	0	2	6	to	0	2	9

Essential Oils and Synthetics

Essential Oils.		£	s.	d.
Anise	c.i.f. 1/9 spot	0	1	10
Bay		0	12	0
Bergamot		0	13	6
Cajaput		0	3	3
Camphor, white	per cwt.	4	0	0
Brown	„	3	15	0
Cassia	c.i.f. 9/6 spot	0	11	0
Cedarwood		0	1	6
Citronella (Ceylon)	c.i.f. 3/10½ spot	0	4	2
(Java)	c.i.f. 4/4 spot	0	4	7
Clove	dearer	0	9	6
Eucalyptus	very firm	0	2	6
Geranium Bourbon		1	15	0
Lavender	dearer	1	6	0
Lavender spike		0	3	3
Lemon		0	2	10
Lemongrass	per oz.	0	0	2½
Lime (distilled)	firm	0	4	0
Orange sweet (Sicilian)		0	10	6
(West Indian)		0	8	6
Palmarosa		1	3	0
Peppermint (American)	dearer	0	16	6
Mint (dementholised Japanese)		0	12	3
Patchouli		1	10	0
Otto of Rose	per oz.	1	15	0
Rosemary		0	1	7
Sandalwood		1	6	0
Sassafras		0	7	6
Thyme	2/6 to	0	8	0

Synthetics.		£	s.	d.
Benzyl acetate	per lb.	0	3	3
Benzoate	„	0	3	6
Citral	„	0	9	6
Coumarine	„	1	0	0
Heliotropine	„	0	8	0
Ionone	„	1	5	0
Linalyl acetate	„	1	2	6
Methyl salicylate	„	0	3	0
Musk xylol	„	0	12	6
Terpeniol	„	0	2	9

Foreign Competition in Superphosphate Trade

At the annual general meeting of Langdale's Chemical Manure Company, held in Newcastle on Friday, November 16, the chairman, Mr. E. L. Beckingham, referring to the effects of foreign competition in the superphosphate trade, said the difficulty was incessant and continuous. There had unfortunately been no relief during the year under review. The French and Belgian makers were favoured by lower wages, lower rates and general cost. Further, the abnormal state of the exchanges gave them an additional advantage in selling on our market. He understood that labour in France was paid at the rate of 20 francs per day, which was equal to 30s. per week of 48 hours; in Belgium, he believed, it was less. As there was no unemployment in these countries, industry was spared the very heavy addition to rates and taxes to deal with it. He heard from the director of a factory in Belgium, of the same output of manures as Langdale's, that the local rates and taxes were £30 against £1,100 to £1,200 Langdales had to pay. The Fertiliser Manufacturers' Association had placed a recommendation before the Prime Minister asking for his assistance to prevent many of the manufacturers of superphosphate from closing down, but he was not sanguine that any help was to be expected from that quarter. What might occur if an import duty were put on French superphosphate, was that the French Government might retaliate by discriminating against us with an export duty on North African phosphate rock. The phosphate rock supplied within the Empire, on account of their distant situation in the Pacific, were at prices beyond the means of chemical manure manufacturers, faced with these selling prices that they were. Difficult as the foreign competition undoubtedly was to fight, the company had not lain down under it during the past year, and, with much contriving and effort had sold more sulphuric acid and manures from their works than last year. There was a growing belief and hope that the tide was on the turn, and improvement in trade generally in sight.

Spanish Chemical Trade

In forwarding the statistics regarding the foreign trade of Spain during the first six months of 1923, the Commercial Secretary at Madrid points out that the comparison between the current year's figures and those for the same period of 1922 gains added interest from the fact that the Anglo-Spanish and other Treaties were not in force at the time. The principal items in the increase of 47 millions of pesetas in chemicals are creosote, colouring materials in powders, paint in liquid or in paste, raw sulphur, commercial and synthetic nitrate, sulphate of ammonia, superphosphates, potato flours, malt, pharmaceutical specialities, and tanning extract. The principal increases in prime materials and metals are iron ores, copper blister, copper and lead. The imports of chemicals for the first six months of 1923 amount to 163·8 million pesetas as against 116·3 million pesetas for the corresponding period of 1922. The exports of chemicals for the first six months of 1923 amount to 63·6 million pesetas as against 60·1 million pesetas for the corresponding period of 1922.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

Glasgow, November 22, 1923.

BUSINESS in the heavy chemical market has been rather unsettled owing to the German Government's apparent intention of refusing to refund the 26 per cent. Reparation Duty to continental merchants. Consequently, spot parcels of German material are inclined to be higher, owing to the possibility of fresh supplies being completely stopped.

Prices of British products are on about the same level as last week.

Industrial Chemicals

ACID, ACETIC.—Good inquiry for export. Glacial, 98/100%, about £60 to £65 per ton, in casks; 80% pure, £49 to £51 per ton; 80% technical, £46 to £47 per ton, c.i.f. U.K. ports, duty free.

ACID BORACIC.—Crystals or granulated, £48 per ton; powdered, £50 per ton, carriage paid U.K. stations, minimum ton lots.

ACID CARBOLIC (ICE CRYSTALS).—Price unchanged at about 1s. 1½d. per lb., f.o.b. U.K. port.

ACID, CITRIC.—B. P. Crystals. Good inquiry for this material. Spot lots now quoted 1s. 4¾d. per lb., less 5 %, ex store.

ACID FORMIC 85%.—Unchanged at £50 to £51 per ton, ex store, spot delivery.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy, ex works.

ACID NITRIC 80%.—£23 10s. per ton, ex station, full truck loads.

ACID OXALIC.—Spot material quoted 5¾d. per lb., ex store. Very little inquiry.

ACID SULPHURIC.—144°, £3 15s. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality, 20s. per ton more.

ACID TARTARIC.—B.P. crystals. Quoted 1s. 1d. per lb., less 5%, ex wharf, early delivery. Spot material obtainable at about the same price.

ALUMINA SULPHATE.—17/18% iron free, quoted £8 5s. per ton, c.i.f. U.K. port, prompt shipment. Spot lots obtainable at about £8 12s. 6d. per ton, ex store.

ALUM, CHROME.—Unchanged at about £24 to £27 per ton according to quality, f.o.b. U.K. ports.

ALUM, POTASH (LUMP).—English material quoted £10 17s. 6d. per ton, f.o.b. U.K. port. Spot lots of continental material still obtainable at about £11 per ton, ex store.

AMMONIA ANHYDROUS.—In little demand. Price unchanged at about 1s. 5¼d. per lb., ex station, spot delivery.

AMMONIA CARBONATE.—Lump, £29 5s. per ton; powder, £31 per ton, f.o.b. U.K. port for export.

AMMONIA LIQUID 880°.—Unchanged at 3d. per lb., delivered, containers extra.

AMMONIA MURIATE.—Grey galvanisers quality about £31 per ton, f.o.r. works. Fine white crystals quoted £25 per ton, c.i.f. U.K. port, but delivery uncertain. Spot lost about £27 per ton, ex store.

AMMONIA SULPHATE.—25¼ % material, £13 2s. per ton; 25¾ % neutral quality, £14 5s. per ton, ex works, November delivery.

ARSENIC, WHITE POWDERED.—Spot lots of English material difficult to obtain. Price about £71 to £72 per ton, ex store. Continental material on offer at about £63 per ton, c.i.f. U.K. port.

BARIUM CHLORIDE, 98/100%.—English material about £14 17s. 6d. per ton. Continental offered at £13 10s. per ton, ex store, spot delivery.

BARYTES.—Finest white English, unchanged at £5 5s. per ton, ex works. Good quality Continental material offered at £5 per ton, c.i.f. U.K. ports.

BLEACHING POWDER.—Spot lots, £11 5s. per ton, ex station Contracts, 20s. per ton less.

BORAX.—Granulated, £24 10s. per ton; crystal, £25 per ton; powdered, £26 per ton, carriage paid U.K. stations, minimum ton lots.

CALCIUM CHLORIDE.—English material, £5 12s. 6d. per ton, ex station. Offered for export at about £4 10s. per ton, f.o.b. U.K. port.

COPPERAS (GREEN).—Unchanged at about £2 2s. 6d. per ton, f.o.b. for export.

COPPER SULPHATE.—Quoted, £25 7s. 6d. per ton, less 5 per cent., f.o.b. U.K. port.

FORMALDEHYDE, 40%.—Spot lots inclined to be higher at £62 to £63 per ton, ex store.

GLAUBER SALTS.—Fine white cyrstals, quoted £3 10s. per ton, ex store.

LEAD (RED).—English material unchanged at £45 per ton, carriage paid U.K. stations. Continental now quoted £36 per ton, c.i.f. U.K. ports. Spot material about £37 10s. per ton, ex store.

LEAD (WHITE).—Spot lots of Continental material offering at about £39 per ton, ex store.

LEAD ACETATE.—White crystals now quoted £43 to £44 per ton, ex wharf spot delivery. Brown about £41 per ton, ex store.

MAGNESITE, CALCINED.—Finest English material offered at £8 per ton, ex station.

MAGNESIUM CHLORIDE.—Quoted £3 10s. per ton, ex store, spot delivery.

MAGNESIUM SULPHATE (EPSOM SALTS).—Commercial quality offered at about £5 per ton, ex store. B.P. quality, £6 5s. per ton, ex station, prompt delivery.

POTASH, CAUSTIC, 88/92%.—Spot material inclined to be higher at about £31 10s. per ton, ex store.

POTASSIUM BICHROMATE.—Unchanged at 5¾d. per lb., delivered.

POTASSIUM CARBONATE, 96/98%.—Offered at £27 per ton, ex store, spot delivery.

POTASSIUM CHLORATE.—Unchanged at about 3d. per lb.

POTASSIUM NITRATE (SALTPETRE).—Offered from the continent at £26 per ton, c.i.f. U.K. port. Spot lots about £30 per ton, ex store.

POTASSIUM PERMANGANATE.—B.P. crystals, unchanged at about 10¼d. per lb., ex store, spot delivery.

POTASSIUM PRUSSIATE (YELLOW).—Moderate export inquiry. Price about 10½d. per lb., f.o.b. U.K. port. Spot lots about 11d. per lb., ex station.

SODA CAUSTIC.—76/77%, £19 7s. 6d. per ton; 70/72%, £17 17s. 6d. per ton; 60/62% broken, £19 2s. 6d. per ton; 98/99% powdered, £22 15s. per ton. All ex station, spot delivery. Contracts 20s. per ton less.

SODIUM ACETATE.—Now quoted £24 17s. 6d. per ton, ex store, spot delivery.

SODIUM BICARBONATE.—Refined re-crystallised quality, £10 10s. per ton, ex quay or station. M.W. quality, 30s. per ton less.

SODIUM BICHROMATE.—Unchanged at 4½d. per lb., delivered.

SODIUM CARBONATE.—Soda Crystals, £5 to £5 5s. per ton, ex quay or station. Alkali 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—Spot lots of continental material inclined to be higher at about £10 10s. per ton, ex store; pea crystals about £14 10s. per ton, ex store.

SODIUM NITRATE.—Refined 96/98% quality quoted £13 5s. per ton, f.o.r. or f.o.b. U.K. port.

SODIUM NITRATE 100%.—Quoted £26 to £27 10s. per ton, according to quality, f.o.b. U.K. port.

SODIUM PRUSSIATE (YELLOW).—In little demand. Price about 5½d. per lb., ex store.

SODIUM SULPHATE (SALTCAKE).—Price for home consumption, £4 5s. per ton carriage paid stations. Good export inquiry.

SODIUM SULPHIDE.—English makers advise advance in price. 60/65% solid now quoted £15 per ton, ex station. Broken, £1 per ton more; 31/34% crystals, £9 7s. 6d. per ton, ex station.

SULPHUR.—Flowers, £10 per ton; roll, £9 per ton; rock, £9 per ton; ground, £8 per ton. Prices nominal.

TIN CRYSTALS.—Now quoted 1s. 3¾d. per lb.

ZINC CHLORIDE.—98/100% solid offered at about £26 per ton, f.o.b. U.K. port, for export.

ZINC SULPHATE.—Spot lots of continental material still available at about £14 15s. per ton, ex store.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

BENZOIC ACID.—Export inquiry. Price 1s. 9d. lb., f.o.b.

DIMETHYLANILINE.—Good demand for export. Price 2s. 8d. lb., f.o.b., drums included.

H ACID.—Some export inquiry. Price quoted 4s. 7d. lb. 100% basis f.o.b.

ORTHO AMIDOPHENOL BASE.—Small home inquiry. Price 12s. lb. 100% basis.

ORTHO TOLUIDINE.—Good export inquiry. Price quoted 11d. lb., f.o.b., drums included.

PARA NITRANILINE.—Some export inquiry. Price quoted 2s. 5d. lb., f.o.b.

PARA AMIDOPHENOL HOL.—Small home inquiry. Price quoted 10s. lb., 100% basis.

TOBIAS ACID.—Small home inquiry. Price 6s. 2d. lb., delivered.

TOLIDINE BASE.—Home inquiry. Price 7s. lb., 100% basis, delivered.

Pink Colouration in Salt Fish

THE red discolouration of dried salted fish by "pink" or "pink eye" has been the subject of a series of experiments carried out for the Food Investigation Board by Dr. P. C. Cloake, whose report has recently been published by H.M. Stationery Office. In an introductory note to the report it is stated that the conditions necessary for the appearance of the condition are a temperature high for our latitude, and moist air. Owing to the water-attracting qualities of the salt used in curing, moisture condenses in the cracks on the surfaces of salt fish, and between the apposed surfaces of fish when they are stacked. It is there, especially in the surface cracks, that "pink" begins. In the process of drying and salting, the fish are handled freely and exposed to the dust from the air. Therefore the surfaces are, as might be expected, generally infected. "Pink" Dr. Cloake finds to be due to at least two organisms—a "red coccus" which occurs in well-defined coccus and sarcinal growths, and an organism of a striking type, so far unidentified, to which the name organism X might for convenience be given. The method of prevention is simple—namely, to sterilise the salt, the utensils, and the rooms. Whether it is commercially feasible only those who know the magnitude of the losses which 'pink' entails upon the industry can say. Dr. Cloake suggests that 5 per cent. of sodium bisulphite added to the salt would be sufficient to prevent the growth of 'pink,' but this would probably increase the cost of curing considerably, and there is objection on hygienic grounds to the use of bisulphites in preserving foods. Salt may also be sterilised by heating to 248° F., a lower temperature will not suffice. There is another possibility, namely, drying the fish further than at present. Unfortunately, as it is shown in the appendix by Dr. Moran and Mr. Piqué, the capacity for reabsorbing water to render the fish palatable, is lost when drying is excessive. The appendix deserves attention for the light thrown on the irreversibility of the drying process.

The Droitwich Salt Industry

AT one time it was hoped that serious steps would be taken to revive the salt making industry at Droitwich, Worcestershire, one of the oldest industrial centres of the kind in the world, for its manufacturing days extend back to Roman times. These days are now ended, as the industry has been transferred to Stoke Works, a village a few miles away. The Worcestershire brine is of remarkable density, and it has now been decided to develop Droitwich as a Spa. Last week, Lord Cobham, Lord Lieutenant of Worcestershire speaking at a ceremony held at the Salter's Hall said that the whole character of the borough had changed. They once had an industry founded in the salt, but that industry had been taken away by the Salt Union to Stoke. Their task was like trying to turn Wigan into a Monte Carlo.

The Manchester Chemical Market

(FROM OUR OWN CORRESPONDENT.)

Manchester, November 22, 1923.

Prices on the chemical market here, helped by the quietly steady demand, though mainly of a hand-to-mouth character, have been fully maintained at the general level of values quoted in my last report, and in some cases scarcity of stocks for prompt or near delivery has been a factor which has given a very decided firmness to certain sections of the market. Export business, as before, is very largely for delivery to colonial consumers, other markets being quiet.

Heavy Chemicals

Sulphide of sodium still fails to attract very much attention, though values are steady at £14 per ton for 60-65 per cent. concentrated solid and round £9 per ton for crystals. Bleaching powder is meeting with a fairly regular inquiry and prices are firm at £11 5s. per ton. Caustic soda is in steady demand, particularly for shipment; quotations are steady at from £16 17s. 6d. per ton for 60 per cent. material to £19 7s. 6d. for 76-77 per cent. Glauber salts meet with a slightly better inquiry and prices are maintained at £3 10s. to £3 15s. per ton. Saltcake is still in good demand for export, with buying on home account rather quiet; prices are steady at round £4 10s. per ton. Nitrite of soda is moderately active at £26 10s. per ton. Prussiate of soda is quiet but values steadier at 5½d. to 5¾d. per lb. Phosphate of soda is firm but only in moderate demand at £14 to £14 10s. per ton. Acetate of soda attracts a fair amount of interest at £23 10s. to £24 per ton. Bicarbonate of soda is firm and in steady inquiry at £10 10s. per ton. Soda crystals are not selling very actively, although values are maintained at £5 5s. per ton. Alkali is in steady demand both for home consumption and for export; values are firm on the basis of £7 10s. per ton for 58 per cent. material. Bichromate of soda is unchanged at 4½d. per lb., a fair amount of business being put through. Chlorate of soda is now on offer at 2⅝d. per lb., buyers taking fair quantities.

Values for caustic potash and carbonate of potash are more or less nominal. Caustic potash is in fair inquiry at, say, between £29 and £30 per ton, with carbonate quoted at about £23 per ton for 90 per cent. and £25 for 96 per cent. material. Permanganate of potash is still a quiet section of the market and values to-day are from 8½d. to 9½d. per lb., according to quality. Chlorate of potash continues to attract a fair amount of buying interest, though prices are rather cheaper at 2¾d. per lb. Yellow prussiate of potash is inactive at 10½d. per lb.

Arsenic appears to be again finding an extended market abroad and quotations are very firmly held; to-day's value in Manchester is about £68 to £70 per ton for white powdered Cornish makes, with foreign brands selling for lower figures. Sulphate of copper still meets with only comparatively slight inquiry, with values held at £25 to £25 10s. per ton, f.o.b. Commercial Epsom salts are only in moderate demand though quotations are steady at £4 to £4 5s. per ton; magnesium sulphate, B.P., is still offering at £6 per ton. Nitrate of lead is rather quiet but firm at about £43 per ton. Acetates of lead are in short supply and values are well held at from £42 to £43 for white and about £45 per ton for brown. Acetate of lime is firmer at £22 for white and £13 to £14 per ton for brown.

Acids and Tar Products

Not much business is being done either in tartaric or citric acids, though prices are steady. Tartaric is quoted at 1s. 1¼d. and citric 1s. 4½d. per lb. Oxalic acid continues dull at 5½d. to 5¾d. per lb. Acetic acid is quiet but steady at £46 for commercial and about £64 per ton for glacial.

The pitch market is inactive, buyers, apparently, holding off as much as possible in the hope of lower prices; current quotations are certainly easier, ranging from £6 to £6 10s. per ton, Manchester. Creosote oil is maintained at 9d. per gallon, though business is poor. Solvent naphtha is offering at 1s. 2d. per gallon, without attracting much attention. Carbolic acid is quiet and easier at about 3s. 3d. per gallon for crude and 1s. 1d. per lb. for crystals. Naphthalenes are unchanged at £19 to £20 per ton for refined and £6 to £11 for crude.

Company News

CASSEL CYANIDE CO.—The directors recommend a final dividend of 6d. per share, making 9d. per share, less tax, for the year.

CHLORIDE AND ELECTRICAL STORAGE CO.—The directors announce an interim dividend of 5 per cent., actual, less tax, on the ordinary shares, the same as a year ago.

DOMINION GLASS CO.—A quarterly dividend of 1¾ per cent. on the common stock is payable on January 2. Last year the dividend was the same.

BIRMINGHAM ALUMINIUM CO.—The net profits for the year ended July 31 were £10,945, and £23,757 was brought forward. A dividend of 6 per cent., free of income-tax, is proposed on the ordinary shares, carrying forward £22,723.

NATAL AMMONIUM CO.—The accounts for the two years to September 30, 1922, show a loss for the period, after charging interest, etc., of £51,886, increasing the debit balance brought down to £70,787.

IDRIS HYDRAULIC TIN.—A second interim dividend in respect of profits for the year 1923 of 6d. per share, less tax at 4s. 6d. in the £, is announced, payable on December 11 to holders on the register on November 16.

EASTMAN KODAK OF NEW JERSEY.—The regular dividend of 1½ per cent. on the preferred stock, and the regular dividend of $1·25 per share, and also an extra dividend of $1.25 per share on the common stock, are payable on January 2 next.

LEVER BROTHERS, LTD.—It is announced that Mr. L. H. Hartland-Swann has joined the board and has been appointed a managing director. He is also chairman of International Icilma Trading Co., Ltd., of Vinolia Co., Ltd., and Blondeau et Cie, Ltd.

ZINC CORPORATION, LTD.—The directors have declared a dividend of 2s. per share on the preference shares, being the last half of the fixed preferential dividend of 20 per cent. for the year 1923, also an interim participating dividend of 1s. per share on both the preference and ordinary shares, out of the profits for the year ending December 31, 1923. These dividends will be payable on January 15, 1924, less tax at 2s. 10½d in the £. A year ago there was no interim on the ordinary, but 10 per cent. was paid in May last for 1922.

ESPERANZA NITRATE CO.—The report for the year ended June 30 states that the oficina, which was closed in June, 1921, was not reopened until April, 1923. The trading profit for the year was therefore derived from the realisation of nitrate stocks brought over from the previous year, from sale of a portion of the quotas allocated to the company by the association, and from the sale of iodine. There was a net profit for the year of £2,807, which has been applied in reducing the construction account to £64,551. There is still a debit in the balance sheet on profit and loss account of £89,551.

PAN DE AZUCAR NITRATE CO.—The report for the year to June 30 states that the balance brought forward was £44,393. After charging the whole of the expenses incurred during the stoppage and cost of reopening the oficina, there was a loss for the year of £1,423, leaving an available balance of £42,970. The directors propose to pay a dividend of 15 per cent., and to carry forward £30,491. The manufacture of nitrate at Pan de Azucar was not resumed until June 1 last, and the trading profit shown above was derived from the realisation of remaining nitrate stocks, from the sale of a portion of quotas allocated to the company, and from the sale of iodine.

BRITISH COTTON AND WOOL DYERS' ASSOCIATION.—The directors report that the profits for the half-year to September 30 last, including income from investments, etc., after charging administration expenses, £4,456 for specific depreciation, and £32,736 for repairs and renewals, and providing an estimated amount in respect of income-tax, corporation profits tax, and other contingencies, amounted to £75,929. From this have to be deducted audit fee and other professional charges £691, interest on first mortgage debenture stock £12,400, debenture holders' trustees £100, and amount transferred to depreciation fund £12,500, leaving the profit for the period at £50,238. The amount brought forward at March 31 last (after deducting £5,250 voted at shareholders' meeting) was £37,132, which makes a credit balance on profit and loss account of £87,370.

CAPE EXPLOSIVES WORKS, LTD.—In a circular to the holders of 7½ per cent. first mortgage debenture stock, the directors state that they have decided to make an issue of £1,250,000 5½ per cent. first mortgage debenture stock, of which £250,000 will be reserved for South Africa, and to offer the same to the holders of the 7½ per cent. first mortgage debenture stock at the rate of £100 of such 5½ per cent. stock in conversion and redemption of each £99 of 7½ per cent. stock, the balance of £1 per cent. plus £3 per cent. premium on each £100 of 7½ per cent. stock being payable to such holder in cash, and so in proportion for fractional parts of £100 stock. Each holder of £100 7½ per cent. stock who desires to convert will thus be entitled to £100 5½ per cent. stock and payment of £4 in cash for each £100 7½ per cent. stock held, provided he lodges the necessary form, duly signed, at the London office of the company, 15, St. Swithin's Lane, E.C.4, or if he is on the South African register, at the office of the company at Kimberley, on or before December 4.

CELLULOSE HOLDINGS AND INVESTMENT CO., LTD.—The first ordinary general meeting of the company was held on Friday, November 16, in London. Mr. A. W. Tait (chairman of the company), presided, and stated that the accounts which were submitted embodied the transactions of the company from May 4, 1922, the date of its incorporation, to June 30, 1923. The net profit accruing to the shareholders was £4,359. The directors had decided to apply the sum of £3,825 in writing off preliminary formation and new issue expenses incurred during that period, leaving a balance of £534, which it was recommended should be carried forward. The revenue arose principally from interest on the company's holding of first mortgage debenture stock of British Celanese, Ltd., and the royalty on sales from that company in accordance with the terms of the agreement. The position to-day was that the company was the holder of the following securities: £700,000 7 per cent. first mortgage debenture stock of British Celanese, Ltd.; £750,000 participating 7½ per cent. preference shares of British Celanese, Ltd.; £225,000 ordinary shares in Midland Counties Electric Power Supply Co., Ltd.; and it also held a royalty agreement with British Celanese, Ltd. On the other hand, the company's own capital account showed that they had issued £750,000 7 per cent. participating first mortgage debenture stock, redeemable at 120 per cent., and 1,060,500 ordinary shares of 1s. each.

Tariff Changes

NEW ZEALAND.—Under the revision of depreciated currency duties recently made the following acids are now admitted free under the British preferential tariff, the intermediate tariff and the general tariff, viz., inorganic acids n.e.i.; also benzoic, carbolic, citric, formic, gallic, lactic, oleic, oxalic, picric, pyrogallic, pyroligneous (crude), salicylic, tannic, and tartaric acids.

FEDERATED MALAY STATES.—A duty of 50 cents per lb. has been imposed on alum unless imported under and in accordance with a licence to import free of duty, granted by the British Resident of the State in which the importer is resident or carrying on his business or trade.

"Hardware Trade Journal" Prize Scheme

TO MARK THE JUBILEE of the *Hardware Trade Journal*, one of the Benn Brothers' Publications, an interesting prize scheme has been announced in which £1,000 is to be distributed. The first prize of £500 will go to the subscriber whose purchases from advertisers in the *Hardware Trade Journal* show the highest ratio to his gross purchases for the period of six months beginning January 1, 1924, and ending June 30, 1924. The competitor with the second highest ratio will receive £200, the competitor with the third highest £100, and there will be forty prizes of £5 each for competitors with the next highest ratios.

The Formation of Free Organic Radicles

MESSRS. J. B. CONANT and A. W. Sloan have recently published a preliminary paper on the formation of free radicles (*J. Amer. Chem. Soc.*, vol. 45, p. 2466). The reduction of triphenylpyrylium chloride with vanadous chloride yields a reddish substance which is insoluble in water and behaves as a free radicle. The same reducing agent reduces triphenylcarbinol in concentrated hydrochloric or sulphuric acid solution to free triphenylmethyl.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

BURLINGTON INDUSTRIAL LABORATORY, LTD., 6 and 7, Charing Cross Chambers, 15, Duke Street, Adelphi, W.C. (C.C., 24/11/23.) £23 19s. 7d. October 9.

LAMBERT (SAMUEL) AND CO., LTD., 10, Great St. Helen's, druggists. (C.C., 24/11/23.) £19 12s. 6d. October 9.

KING, Harold, Crown Chemical Works, Mitcham Common, chemist. (C.C., 24/11/23.) £38 10s. 2d. October 10.

WHITEHEAD, Harold, 7, Newton Park, Lightcliffe, dyer and finisher. (C.C., 24/11/23.) £22 4s. 6d. October 8.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

ASHWORTH (H. B.), LTD., Blackburn, petroleum refiners, etc. (M., 24/11/23.) Registered November 9, £800 debentures (filed under sec. 93 (3) of the Companies (Consolidation) Act 1908), present issue £600; general charge. *Nil. December 31, 1922.

BASIC SLAG AND PHOSPHATE COMPANIES, LTD. (late SLAG PHOSPHATE CO., LTD.), London, S.W. (M., 24/11/23.) Registered November 8, debenture to bank; charged on properties mentioned in schedule, also general charge. *Nil. January 14, 1922.

FLINN AND SON, LTD., Fishergate, dyers. (M., 24/11/23.) Registered November 9, £1,450 mortgage, to Sir B. S. Johnson, Abbots Lea, Woolton, and others; charged on 20, Claremont Road, Surbiton. *£6,000. April 4, 1923.

ORGANAM, LTD. (late ELSTREE CHEMICAL WORKS (1922), LTD.), London, E.C. (M., 24/11/23.) Registered November 8, £250 debentures part of £2,000; general charge.

SMITHS (HAMPTON), LTD., soap manufacturers. (M., 24/11/23.) Registered November 7, charge collateral to charge dated July 1, 1921, securing £9,000 outstanding, to W. A. Jones, 39, Orchard Road, Kingston-on-Thames; general charge (to rank in priority to Trust Deed dated September 2, 1921). *£28,500. December 19, 1922.

WHELPTON (G.) AND SON, LTD., Hemel Hempstead, manufacturing chemists. (M., 24/11/23.) Registered November 7, mortgage, to bank; charged on company's freehold property at Hammerfield, Hemel Hempstead. *£650. May 18, 1923.

London Gazette

Partnership Dissolved

HAYTON AND CO. (Matthew HAYTON, Wilfred HAYTON and George Stanley HAYTON), wholesale druggists, 99, Gilesgate, Durham, by mutual consent so far as concerns M. Hayton, as from May 7, 1923. Debts received and paid by W. Hayton and G. S. Hayton, who will continue the business.

Company Winding Up

ANGLO-ULTRAMARINE TRADING CO., LTD., Bassishaw House, 70A, Basinghall Street, in the city of London. (C.W.U., 24/11/23.) Winding-up Order, November 13.

Companies Winding Up Voluntarily

ALSACE-LORRAINE DEVELOPMENT AND TRADING CO., LTD. (C.W.U.V., 24/11/23.) A. H. Partridge, of Fincham, Partridge and Co., chartered accountants, 3, Warwick Court, Gray's Inn, London, W.C.1, appointed liquidator. Meeting of creditors at the liquidator's office on Friday, November 23, at 2.30 p.m.

WAFERLEAF GELATINE, LTD. (C.W.U.V., 24/11/23.) R. A. McQuitty, 78–81, Fetter Lane, London, E.C.4, appointed liquidator.

Notices of Dividends

CALVERT, Jackson, "Wagaraw," Greenhead Road, Huddersfield, manufacturing chemist. First and final dividend of 4s. 10¾d. per £, payable November 20, Official Receiver's Office, 12, Duke Street, Bradford.

MYER, Robert Henry, trading as ROSS SUPPLY CO., 186, Wandsworth Road, S.W.8, manufacturing perfumer. First and final dividend of 4s. 4d. per £, payable November 22, David Hart (Trustee), 5, Argyll Street, London.

Notice of Intended Dividend

BOTTOMLEY, Thomas, Tannerfield Works, Hightown, Liversedge, chemical manufacturer. Last day for receiving proofs, November 30. Trustee, W. Durrance, Official Receiver, 12, Duke Street, Bradford.

New Companies Registered

ALSACE-LORRAINE AND GENERAL PRODUCTS CO., LTD. Importers and manufacturers of and dealers in metals, chemicals, industrial and other compounds, cements, oils, paints, pigments and varnishes, etc. Nominal capital, £10,000 in 6,000 7 per cent. cumulative preference and 3,600 ordinary shares of £1 and 8,000 founders' shares of 1s. each. Solicitors: Hutchison and Cuff, 6, Stone Buildings, Lincoln's Inn, W.C.2.

BELLAMY AND WAKEFIELD, LTD. Manufacturing wholesale and retail chemists, druggists and drysalters, etc. Nominal capital, £3,000 in £1 shares. Solicitors: Rooke and Bradley, 83, Colmore Row, Birmingham.

MINERAL DEPOSITS, LTD., 17, Mincing Lane, London, E.C.3. Miners, smelters, refiners, searchers for ores and minerals, importers, exporters, etc. Nominal capital, £2,100 in 2,000 10 per cent. cumulative preference shares of £1 and 2,000 ordinary shares of 1s.

SALIP, WARDEN AND CO., LTD., Catalonia House, Great Alie Street, Whitechapel, London, E. Manufacturers, agents and general dealers in all branches of the cork industry, including linoleum and floorcloth. Nominal capital, £20,000 in £1 shares.

SANAPHOS, LTD. To carry on the business of manufacturers of foods, medicinal preparations, casein and other products derivable from milk, etc. Nominal capital, £2,000 in £1 shares. Solicitors: C. Butcher and Simon Burns, 32, Gresham Street, London, E.C.2.

T. SAVILLE WHITTLE (EXPORT), LTD., 19, Lloyd Street, Albert Square, Manchester. Exporters of heavy drugs, chemicals and machinery, chemists, druggists, drysalters, oil and colourmen, etc. Nominal capital, £10,000 in £10 shares.

The Removal of Indene from Gases

MR. R. L. BROWN, associate physical chemist of the U.S. Department of the Interior, attached to the Pittsburg experiment station of the Bureau of Mines, and working in co-operation with the American Gas Association, is investigating gum formation and removal of indene from artificial gases by the use of high temperatures and various gaseous reactants. The application of this research would come in the removal of indene and similar gum-forming constituents from gases, particularly carburetted water gas, in the plant, thus eliminating stoppages and attending results in distributing systems. In a study of indene and styrene in water-gas tar, made by Mr. Brown, the composition of water-gas tar was examined, and indene and styrene, which have not been identified heretofore as constituents, were shown to be present, and their amounts were determined. Indene and styrene were proved to be active in forming gummy deposits in distributing systems for carburetted water gas.